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ABSTRACT

This programed instruction study guide is one of a series that form a first-year algebra course. Structured in a multiple-choice question-answer format with scrambled pages, it is intended to be used in conjunction with a computer-managed instructional system. The following topics are covered in Volume 2: punctuation marks; order of operations; evaluating algebraic expressions; identifying factors, coefficients, and exponents; solving open sentences; and translating verbal mathematical relationships into algebraic expressions. Reading and homework assignments are taken from the text "Modern Algebra - Book I" by Dolciani. (Related documents are SE 015 854 - SE 015 870.) (DT)

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PROGRAMMED MATH CONTINUUM

level one

ALGEBRA

U.S. DEPARTMENT OF HEALTH
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VOLUME

2

NEW YORK INSTITUTE OF TECHNOLOGY
OLD WESTBURY, NEW YORK

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P R O G R A M M E D M A T H C O N T I N U U M

LEVEL ONE

A L G E B R A

VOLUME 2

New York Institute of Technology

Old Westbury - New York

PREFACE

This volume is one of a set of 18
that form a complete course
in
ALGEBRA - LEVEL ONE

The volume has been structured
in a multiple choice question-answer format,
with the pagination scrambled
and
is to be used in conjunction with
a program control console
utilizing
punch card input.

It is one exhibit in the demonstration of a model
developed under the direction of
the U S. Department of Health Education and Welfare
Project 8-0157

at the

New York Institute of Technology
Westbury, New York

VOLUME 2

B

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IN THE STUDY GUIDE:

QUESTION:	SEGMENT:	IS ON PAGE:
1	1	$\frac{1}{1}$
1	2	$\frac{40}{1}$
1	3	$\frac{80}{1}$
1	4	$\frac{121}{2}$
1	5	$\frac{171}{2}$

C

VOLUME 2

This volume covers the following material as shown in this excerpt from the Syllabus:

SEGMENT	DESCRIPTION	REFERENCE BOOK SECTION		
		DOLCIANI	DRESSLER	DODES
1	Punctuation marks Order of operations	1 - 8 1 - 9	1 - 6 1 - 5 (1 - 7)	2 - 7 4 - 10
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5	From symbols to words From words to symbols	2 - 4 2 - 5	3 - 3 1 - 8 3 - 3	5 - 5

READING ASSIGNMENT

VOLUME 2

Before you begin to answer the questions in this STUDY GUIDE you should read the pages indicated.

SEGMENT	FROM PAGE	TO PAGE
1	19	24
2	35	37
3	40	41
4	44	46
5	49	54

Modern Algebra Book I
Dolciani, Berman and Freilich
Houghton Mifflin, 1965

Read EVERYTHING contained in these pages.

EXAMINE every illustrative problem.

Write in your NOTEBOOK:

1) Every RULE that has been stated
2) Every DEFINITION that has been presented
3) Solve at least ONE PROBLEM of each type covered in the lesson.

If you wish additional information for enrichment purposes consult:

Algebra I
Dodes and Greitzer
Hayden Book Co., 1967

You will be given additional notes at various places in the STUDY GUIDE.

These, too, should be entered in your NOTEBOOK.

E

HOMEWORK ASSIGNMENT

VOLUME NO. 2

BOOK: DOLCIANI

HOMEWORK QUESTION NO.	PAGE NO.	EXAMPLE NUMBER	MBO REFERENCE
1	21	1 - 15	02110 - 02112
2	22	13 - 16	02120
3	23	11 - 20	02130 - 02132
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6	41	23 - 34	02322 , 02324
7	42	35 - 44	02330
8	42	45 - 56 and 25 - 36	02340 , 02342 , 02343
9	46	1 - 15	02410
10	47	1 - 10	02410
11	48	21 - 30 , 41 - 45	02420 , 02430
12	50	1 - 14	02510 , 02512
13	53	4 - 14	02520
14	54	1 - 25	02520
15	55	9 - 15	02520

GENERAL INSTRUCTIONS

Ask your teacher for:

PUNCH CARD
PROGRAM CONTROL
ANSWER MATRIX

When you are ready at the PROGRAM CONTROL

Insert the PUNCH CARD in the holder
Turn to the first page of the STUDY GUIDE
Read all of the instructions
Read the First Question

Copy the question
Do your work in your notebook
Do all of the computation necessary
Read all of the answer choices given

Choose the Correct answer
(remember, once you've punched the card
it can't be changed)

Punch the card with the STYLUS

Read the instruction on the PROGRAM CONTROL
(it tells you which page to turn to)

TURN TO THAT PAGE:

If your choice is <u>not correct</u> you will be given additional hints, and will be directed to return to the question and to choose another answer.

If your choice is <u>correct</u> then you will be directed to proceed to the next question located immediately below, on the same page.

If you have no questions to ask your teacher now, you can turn the page and begin. If you have already completed a SEGMENT turn to the beginning of the following segment;

CHECK THE PAGE NUMBER BY LOOKING AT THE TABLE OF CONTENTS

VOLUME 2 SEGMENT 1 begins here:

Obtain a PUNCH CARD from your instructor. In addition to the other identifying information that must be furnished by you, you are asked to punch out the following:

COLUMNS	48 and 50	0 6	(Segment Number)
	54 and 56	0 4	(Type of Punch Card)
	60 and 62	0 2	(Volume Number)
	66 and 68	0 1	(Segment Number)

Introductory Note

Suppose that a number of small gifts were divided among a few boys by placing each boy's gifts in a pile on the table, each pile belonging to a different boy. If one of the boys desired to protect his share or to keep it separate from the other shares, he might cup his hands and encircle the pile of gifts belonging to him. What is the shape of his two cupped hands? It is a parenthesis ( ) . Similarly, in mathematics parentheses are symbols of inclusion. It is a symbol used to show that the entire expression within the symbol is the name of one number.

In this segment you will learn about the various symbols of inclusion used in mathematics and how to work with them.

You will now be asked a series of questions to draw your attention to the more important points.

Question 1

Apply the proper principle and select the letter which has the correct answer to the following question: Which is the largest number?

I. $(2 + 3) \times 4$

II. $3 \times (2 + 4)$

III. $4 \times (2 \times 3)$

(A) I

(B) II

(C) III

(D) They are all the same.

$\frac{2}{1}$

Sorry, but your choice is incorrect. When working with fractions, the line between the numerator and denominator is not only a division sign; but it is also a symbol of inclusion. You must first simplify the numerator and write it as a single number and then simplify the denominator and write it as a single number. Thus for example,

$$\frac{8\ (\ 3\ +\ 2\ +\ 1\ )}{7\ (\ 11\ -\ 8\ )} = \frac{8\ (\ 6\ )}{7\ (\ 3\ )} = \frac{48}{21} = \frac{16}{7}$$

Please return to page $\frac{22}{2}$ and try this question again.

$\frac{2}{2}$

What procedure do we follow in simplifying an expression that has more than one symbol of inclusion? We first simplify the numbers that are in the innermost symbol. Thus, in this question you first write

$$(\ 4\ +\ 2\ )\ =\ 6$$

and then simplify the expression in the brackets.

Please continue.

Please return to page $\frac{20}{1}$ and try this question again.

$\frac{3}{1}$

Sorry, your choice is incorrect. The expression

$$4 + (2 + 3)$$

is the same as $4 + 5 = 9$

When simplifying expressions with parentheses, you first combine the numbers within the parentheses, and then perform the indicated operations. In this case, 4 is added to 5 , not multiplied.

Please return to page $\frac{17}{2}$ and try this question again.

$\frac{3}{2}$

A number written immediately before a parenthesis means that this number multiplies the expression inside the parenthesis.

Thus, for example;

$$7 (3 + 6)$$

means 7×9

Please return to page $\frac{27}{2}$ and try this question again.

$\frac{4}{1}$

Very good. You made the correct choice.

In the absence of symbols of inclusion multiplication and division are performed in order from left to right first.

Thus, the expression

$$18 \div 9 + 3 \times 4$$

is the same as $(18 \div 9) + (3 \times 4)$

which becomes: $2 + 12 = 14$

Please go on to question 12 below.

$\frac{4}{2}$

Question 12

Apply the proper principle and simplify the expression,

$$3 [6 + 48 \div 6 - 4 \div 2]$$

Select the letter which labels the correct statement.

(A) $3\frac{1}{2}$

(B) $40\frac{1}{2}$

(C) 36

(D) None of these.

$\frac{5}{1}$

You must have made a careless error. Examine the given numerator,

$$49 - 5 (3 + 2)$$

Notice that the numbers inside the parenthesis are connected with a plus sign.

Thus, we have $49 - 5 (5) = 49 - 25$

Please continue.

Return to page $\frac{10}{2}$ and try this question again.

$\frac{5}{2}$

Sorry, but your choice is incorrect.

Please check your arithmatic. Decide which operations should be done before the others.

Return to page $\frac{24}{1}$ and try this question again.

$\frac{6}{1}$

We don't agree.

The choices represent different numbers. Please note that

$$(2 + 3) \times 4 = 5 \times 4$$

and

$$3 \times (2 + 4) = 3 \times 6$$

Please return to page $\frac{1}{2}$ and try this question again.

$\frac{6}{2}$

When we have more than one symbol of inclusion, we first simplify the innermost symbol.

In this question, we have to simplify

$$\left(\frac{72 - 18}{9}\right)$$

Write this fraction as a single number and continue.

Please return to page $\frac{13}{2}$ and try this question again.

If you examine the given expression, you will notice that it has three different symbols of inclusion. The innermost symbols are parentheses. We must therefore, simplify the numbers within these symbols. Thus, we begin as follows:

$$\{13 - [35 - (3 + 8 + 17)] - 19\} =$$

$$\{13 - [35 - 28] - 19\}$$

Please continue.

Return to page 28/2 and try this question again.

When the number of different symbols of inclusion increases, greater care must be taken to avoid making mistakes. You should proceed one step at a time, simplifying the innermost symbols first. We will do a question of equal difficulty to illustrate the procedure that you should follow.

Simplify the expression,

$$\{12 + [21 - 13 + 4(14 - 8)]\} - 20$$

We first simplify the innermost symbols of inclusion, and re-write the expression with this symbol removed:

$$\{12 + [21 - 13 + 4 \times 6]\} - 20$$

Now, we simplify the expression in the brackets, and again re-write the expression with this symbol removed:

$$\{12 + 21 - 13 + 24\} - 20$$

Finally, we remove the braces by performing the indicated operations within this symbol.

We get $44 - 20 = 24$

Return to page 38/2 and try this question again.

$\frac{8}{1}$

Yes, but your answer is not in lowest terms.

The fraction you chose can be reduced. Please do so.

Return to page $\frac{10}{2}$ and try this question again.

$\frac{8}{2}$

The expression

$$7\ (\ 5\ +\ 1\ )$$

means

$$7\ \times\ (\ 5\ +\ 1\ )\ =\ 7\ \times\ 6\ =\ 42$$

Please keep in mind that a number immediately preceeding a parenthesis means that this number multiplies the expression within the parenthesis.

Return to page $\frac{24}{1}$ and try this question again.

We do not agree. How do we simplify this expression? In answer to this question, let us do a similar question together. Simplify the expression,

$$\frac{9\ (\ 7\ -\ 1\ )}{4\ (\ 6\ +\ 3\ )}$$

We start with the numerator. Combining the numbers in the parenthesis, we have

$$9\ (\ 6\ )\ =\ 54$$

Similarly, the denominator becomes

$$4\ (\ 9\ )\ =\ 36$$

Thus, we obtain

$$\frac{54}{36}$$

This fraction can be reduced to $\frac{3}{2}$ by dividing numerator and denominator by 18 .

Please return to page $\frac{29}{1}$ and try this question again.

Sorry, but your choice is not correct. Let us do a similar question together. Follow the procedure carefully, and you will discover your error. Simplify the expression,

$$\left\{\left(\frac{28\ -\ 12}{4}\right)\ \div\ 2\right\}\ +\ 8$$

We first simplify the expression within the innermost symbol, and this is:

$$\left(\frac{28\ -\ 12}{4}\right)\ =\ \frac{16}{4}\ =\ 4$$

We now have,

$$\{4\ \div\ 2\}\ +\ 8$$

Simplifying the numbers within the braces, we get

$$2\ +\ 8\ =\ 10$$

Please return to page $\frac{13}{2}$ and try this question again.

$\frac{10}{1}$

Very good. You made the correct choice. We have to simplify the expression,

$$\frac{2\ (\ 7\ +\ 5\ -\ 3\ )}{3\ (\ 9\ -\ 4\ )}$$

First, we simplify the numerator by combining all the numbers inside the parenthesis. We get,

$$2\ (\ 9\ )\ =\ 18$$

Then, we simplify the denominator by first writing all the numbers in the parenthesis as one number. We get,

$$3\ (\ 5\ )\ =\ 15$$

Hence, the fraction becomes

$$\frac{18}{15}$$

Finally, we divide the numerator and denominator of this fraction by 3 and obtain $\frac{6}{5}$ as the answer.

Please go on to question 5 below.

$\frac{10}{2}$

Question 5

Apply the proper principle and simplify the expression,

$$\frac{49\ -\ 5\ (\ 3\ +\ 2\ )}{7\ +\ 5}$$

Select the letter which labels the correct simplification.

(A) $\frac{19}{12}$ (C) 2

(B) $\frac{24}{12}$ (D) $2\frac{20}{12}$

You did not complete the question.

After simplifying the expression in the brackets, you should multiply this expression by $\frac{1}{2}$.

Please return to page $\frac{27}{2}$ and try this question again.

We do not agree.

The expression,

$$3\ [\ 6\ +\ 48\ \div\ 6\ -\ 4\ \div\ 2\ ]$$

is the same as

$$3\ [\ 6\ +\ (\ 48\ \div\ 6\ )\ -\ (\ 4\ \div\ 2\ )\ ]$$

Please continue.

Please return to page $\frac{4}{2}$ and try this question again.

$\frac{12}{1}$

Sorry, but your choice is not correct.

The expression

$$(2 + 3) \times 4$$

means

$$5 \times 4 = 20$$

One of the choices is a number greater than 20 .

Please return to page $\frac{1}{2}$ and try this question again.

$\frac{12}{2}$

Have you considered the order of operations?

Please note that the expression

$$14 \times 2 - 2 \div 2$$

means

$$(14 \times 2) - (2 \div 2)$$

Please return to page $\frac{18}{1}$ and try this question again.

Very good. You made the correct choice. The other choices are wrong.

In simplifying an expression that has more than one symbol of inclusion, we first simplify the innermost symbol.

Thus, we have

$$[\ 30 + (\ 4 + 2\ )\ ] \div 12$$

The innermost symbol is the parenthesis. Hence, we write

$$(\ 4 + 2\ ) = 6$$

We now have

$$[\ 30 + 6\ ] \div 12 =$$

$$36 \div 12 = 3$$

Please go on to question 7 below.

Question 7

Apply the proper principle and simplify the expression,

$$\left\{\left(\frac{72 - 18}{9}\right) \div 3\right\} + 3$$

Select the letter which labels the correct statement.

(A) 9

(B) 5

(C) 6

(D) None of these.

$\frac{14}{1}$

When a number is written immediately before a parenthesis, that number multiplies whatever is inside that parenthesis.

For example,

$$2\ (\ 3\ +\ 4\ +\ 1\ )$$

means

$$2 \text{ times } (\ 3\ +\ 4\ +\ 1\ )$$

We must perform the operations within the parentheses first;

that is,

$$(\ 3\ +\ 4\ +\ 1\ )\ =\ 8$$

Therefore, the problem becomes

$$2 \times 8$$

Please return to page $\frac{17}{2}$ and try this question again.

$\frac{14}{2}$

Sorry, but your choice is not correct.

The expression,

$$18 \div 9 + 3 \times 4$$

is the same as

$$(\ 18 \div 9\ ) + (\ 3 \times 4\ )$$

Since the multiplication and divisions are done before the additions and subtractions.

Please re-read the top of page 23 of your text assignment.

Please return to page $\frac{26}{2}$ and try this question again.

You must have made a mistake in your arithmetic.

Did you observe that this question has three different symbols of inclusion? Naming these symbols in order, that is; the innermost symbols first, we have parentheses, brackets, and braces.

In order to avoid errors, it is important to proceed carefully, one step at a time. We begin by removing the innermost symbol first.

Thus,

$$\{13 - [35 - (3 + 8 + 17)] - 19\} =$$
$$\{13 - [35 - (28)] - 19\} =$$
$$\{13 - [35 - 28] - 19\}$$

Now, proceed by simplifying the expression in the brackets.

Please continue.

Please return to page $\frac{28}{2}$ and try this question again.

Did you find this question difficult? It is. That's all the more reason why you will enjoy getting it right.

If we examine the given expression, we note that there are four different symbols of inclusion. Which is the innermost symbol?

Yes, the bar over

$$3 + 2$$

You should, therefore, begin by simplifying this expression.

We can write,

$$2\{3 + 4[5 + 6(5 + 4 \times 5)]\} =$$
$$2\{3 + 4[5 + 6(25)]\}$$

Please continue from here.

Please return to page $\frac{35}{2}$ and try this question again.

II

$\frac{16}{1}$

Examine the numerator of the given fraction. Note that the two numbers in the parentheses must be added first. That answer is multiplied by 5 .

Then this result is subtracted from 49 . The 5 cannot be subtracted from 49 before it multipleis the parentheses.

Please return to page $\frac{10}{2}$ and try this question again.

$\frac{16}{2}$

We don't agree.

One of the letters does have the correct answer next to it.

Please reconsider your choice.

Return to page $\frac{27}{2}$ and try this question again.

Very good. You made the correct choice; we have,

$$(2 + 3) \times 4 =$$

$$5 \times 4 = 20$$

$$3 \times (2 + 4) =$$

$$3 \times 6 = 18$$

$$4 \times (2 \times 3) =$$

$$4 \times 6 = 24$$

Please go on to question 2 below.

Question 2

Apply the proper principle and select the letter which labels the correct statement.

(A) $4 + (2 + 3) = (4)(5)$

(B) $3(2 + 4) = (3)(6)$

(C) $4(2 \times 3) = 20$

(D) $5 + 3(4 + 2) = 8(6)$

18
1

This is the correct answer.

Please go on to question 10 below.

Question 10

Apply the proper principle and simplify the expression:

$$14 \times 2 - 2 \div 2$$

Select the letter which labels the correct statement.

(A) 0 (C) 27

(B) 13 (D) None of these.

18
2

Sorry, but you made an incorrect choice.

Recall that a number immediately before a symbol of inclusion means that this number multiplies the expression within this symbol.

Thus,

$$0\,(8 - 2)$$

means

$$0 \times (8 - 2) =$$

$$0 \times 6$$

Now, you know that zero times any number is equal to zero.

Please continue.

Please return to page 32 and try this question again.

Very good. You made the correct choice.

We have to simplify the expression:

$$62 - 2\{39 - [4(7 - 6) + 4(1 + 6)] + 9\}$$

We first simplify the expression within the innermost symbols of inclusion. We get:

$$62 - 2\{39 - [(4 \times 1) + (4 \times 7)] + 9\} =$$

$$62 - 2\{39 - [4 + 28] + 9\}$$

Next we simplify the expression within the brackets.

We get:

$$62 - 2\{39 - [32] + 9\} =$$

$$62 - 2\{39 - 32 + 9\} =$$

$$62 - 2\{16\} =$$

$$62 - 32 =$$

$$30$$

Since this is not one of the numbers given, " none of these " is correct.

Please go on to question 16 below.

Question 16

Apply the proper principle and simplify the expression,

$$\{21 + 3[9(6 - 4) - 3]\} - 26(8 - 6)$$

Select the letter which labels the correct statement.

(A) 10

(B) 40

(C) 14

(D) None of these.

$\frac{20}{1}$

This is the correct answer.

Please go on to the next question.

Question 6

Apply the proper principle and simplify the expression

$$[30 - (4 + 2)] \div 12$$

Select the letter which labels the correct result.

(A) $30 - \frac{1}{2}$

(B) 15

(C) 3

(D) None of these.

$\frac{20}{2}$

We do not agree.

Go over your work and check your order of operations.

Please return to page $\frac{13}{2}$ and try this question again.

We first combine the numbers in the parenthesis. Thus,

$$3 \times (2 + 4) =$$

$$3 \times 6$$

This is not the largest number.

Please return to page $\frac{1}{2}$ and try this question again.

We do not agree.

The bar over 3×14

is a symbol of inclusion, just like the parenthesis.

This expression should, therefore, be simplified first.

Thus,

$$[\overline{3 \times 14} - 8 (9 - 6)] =$$

$$[42 - 8 (3)] =$$

$$[42 - 24]$$

Please continue.

Please return to page $\frac{24}{1}$ and try this question again.

$\frac{22}{1}$

Very good. You made the correct choice. The expression

$$\frac{6(3 + 5)}{2(12 - 3)} = \frac{6(8)}{2(9)} = \frac{48}{18} = \frac{8}{3}$$

The last fraction was obtained by dividing the numerator and denominator of the previous fraction by 6 .

Please go on to question 4 below.

$\frac{22}{2}$

Question 4

Apply the proper principle and simplify the expression,

$$\frac{2(7 + 5 - 3)}{3(9 - 4)}$$

Select the letter which labels the correct simplification

(A) $\frac{2}{3}$ (C) $\frac{30}{39}$

(B) $\frac{6}{5}$ (D) $\frac{16}{23}$

We do not agree.

One of the letters does have the correct answer next to it.

Please reconsider your choice.

Please return to page $\frac{28}{2}$ and try this question again.

Sorry, but your choice is incorrect.

Did you begin by first simplifying the innermost symbols of inclusion?

You should have started as follows:

$$\{21 + 3\ [9(6 - 4) - 3]\} - 26(8 - 6) =$$

$$\{21 + 3\ [9 \times 2 - 3]\} - 26 \times 2 =$$

$$\{21 + 3\ [18 - 3]\} - 52$$

Please continue.

Please return to page $\frac{19}{2}$ and try this question again.

$\frac{24}{1}$

This is the correct answer.

Please go on to the next question below.

Question 9

Apply the proper principle and simplify the expression,

$$7\ (5\ +\ 1)\ +\ [\overline{3\ \times\ 14}\ -\ 8\ (9\ -\ 6)]$$

Select the letter which labels the correct statement.

(A) 70

(B) 31

(C) 60

(D) 63

$\frac{24}{2}$

If a variable has a replacement set which contains only a single quantity, it is called a constant. Did you have any information about the replacement set? Since you did not, you do not know if it is a constant.

Therefore, this choice is not correct.

Please return to page $\frac{42}{2}$ and try question 1 again.

We do not agree. The expression

$$5 + 3(4 + 2)$$

means

$$5 + 3(6) =$$

$$5 + 18 =$$

$$23$$

The procedure we use is as follows:

We combine the numbers within the parenthesis; thus,

$$4 + 2 = 6$$

Then we multiply this number by the number before the parenthesis, getting

$$3(6) = 18$$

The 5 is not added to the 3 before multiplying. Finally, we obtain

$$5 + 18 = 23$$

Please return to page $\frac{17}{2}$ and try this question again.

No. One of the other answers is correct.

Please re-check your work and make the correct choice.

Please return to page $\frac{35}{2}$ and re-do the question.

$\frac{26}{1}$

Very good. You made the correct choice.

Mathematicians have agreed on the following rule:

If symbols of inclusion are omitted, multiplication and division are performed in order from left to right. Thus,

$$14 \times 2 - 2 \div 2$$

is equivalent to

$$(14 \times 2) - (2 \div 2) =$$

$$28 - 1 = 27$$

Note that a number divided by itself is equal to 1 .

Please go on to question 11 below.

$\frac{26}{2}$

Question 11

Apply the proper principle and simplify the expression,

$$18 \div 9 + 3 \times 4$$

Select the letter which labels the correct statement.

(A) 14

(B) $\frac{6}{7}$

(C) 20

(D) None of these.

Very good. You made the correct choice.

In simplifying an expression which has more than one symbol of inclusion, we first simplify the innermost symbol.

Thus, we have;

$$\left\{ \left(\frac{72 - 18}{9} \right) \div 3 \right\} + 3$$

$$\left\{ (6) \div 3 \right\} + 3$$

$$\left\{ 2 \right\} + 3$$

$$5$$

Simplifying $\left(\frac{72 - 18}{9} \right)$

we get $\frac{54}{9} = 6$

Please go on to question 8 below.

Apply the proper principle and simplify the expression

$$\frac{1}{2} \left[5 (3 + 5) + 2 (7 - 4) \right]$$

Select the letter which labels the correct statement.

(A) 23 (C) 46

(B) $\frac{19}{2}$ None of these.

$\frac{28}{1}$

Very good. You made the correct choice. The expression,

$$3\ [6\ +\ 48 \div 6\ -\ 4 \div 2\ ]$$

is the same as

$$3\ [6\ +\ (48 \div 6)\ -\ (4 \div 2)]$$

Simplifying the innermost symbols of inclusion first, we get

$$3\ [6\ +\ 8\ -\ 2]$$

$$3\ [\ 12\ \ ]$$

$$36$$

Please go on to question 13 below.

$\frac{28}{2}$

Question 13

Apply the proper principle and simplify the expression,

$$\{13\ -\ [35\ -\ (3\ +\ 8\ +\ 17)]\ +\ 19\}$$

Select the letter which labels the correct statement.

(A) 22

(B) 25

(C) 26

(D) None of these.

This is the correct answer.

Please go on to the next question.

Question 3

Apply the proper principle and simplify the expression

$$\frac{6(3 + 5)}{2(12 - 3)}$$

Select the letter which labels the correct simplification.

(A) $\frac{8}{3}$ (C) $\frac{4}{9}$

(B) $\frac{23}{21}$ (D) None of these other choices.

Sorry, but we do not agree.

Keep in mind the three numbers that came up on the dice and follow the instructions.

The first number doubled is 4 . Adding 5 , we get 9 .

Multiplying this result by 5 , we get 45 . Now, we add the number on the second die, and obtain 49 . Multiplying this number by 10 , we have 490.

Finally, we add the number on the third die and end up with 495 .

Now simplify the expressions next to the letters and find out which one equals 495 .

Please return to page $\frac{30}{2}$ and try this question again.

30/1

Very good. You made the correct choice. We have a simplify the expression

$$2\left\{3 + 4\ [5 + 6(5 + 4 \times \overline{3 + 2})]\right\}$$

We proceed by first simplifying the expression within the innermost symbol of inclusion; that is,

We get:
$$2\left\{3 + 4\ [5 + 6(5 + 4 \times \overline{3 + 2})]\right\} =$$
$$2\left\{3 + 4\ [5 + 6(5 + 20)\ ]\right\}$$

Now, we simplify the expression within the parenthesis. We obtain,

$$2\left\{3 + 4\ [5 + 6 \times 25]\right\} =$$
$$2\left\{3 + 4\ [5 + 150]\right\}$$

Next, we simplify the expression within the brackets. Thus, we get

$$2\left\{3 + 4 \times 155\right\} =$$
$$2\left\{3 + 620\right\} =$$
$$2\left\{623\right\} =$$
$$1246$$

Please go on to question 18 below.

30/2

Question 18

Relate to the proper principle and select the letter which correctly describes the following instructions: You have tossed three dice and the numbers 2, 4, and 5 came up. Take the number of the first die, double it and add 5 to the result; multiply the number you now have 5, add the number on the second die, and multiply the number you now have by 10. Finally, add to this the number on the third die.

(A) $10\ [2(2 + 5) + 4] + 5$

(B) $10\ [4(5 \times 2) + 4] + 5$

(C) $10\ [[5(2 \times 2 + 5) + 4] + 5$

(D) None of these.

A variable represents any of the elements of a certain set.

While the set may have many elements, it also may not.

It might have only one element; therefore, this choice is not correct.

Please return to page 42/2 and try question 1 again.

An expression is called an open expression if it contains a variable, not a constant. Since this expression contains a variable, it <u>is</u> an open expression.

Therefore, this choice is not correct.

Please return to page 49/2 and try question 4 again.

$\frac{32}{1}$

This is the correct answer.

Please go on to question 14 which follows.

Question 14

Apply the proper principle and simplify the expression,

$$\left\{21 + [\ 12 - 0(8 - 2)\ ]\right\}$$

Select the letter which labels the correct statement.

(A) 33

(B) 27

(C) 35

(D) None of these.

$\frac{32}{2}$

There are seven days in the week; that is true, but that is not what the question asked.

Please return to page $\frac{54}{2}$ and try question 6 again.

Since the length of the ladder represented by c is always the same, c is a constant.

Therefore, this choice is not correct.

Please return to page $\frac{51}{2}$ and try question 2 again.

This is a very nice value, but it is not the value you were asked to find.

Did you fail to see the decimal point?

Please return to page $\frac{46}{2}$ and try question 8 again.

34/1

This is a fine value, but is it the only one? How many values did the replacement set for w contain?

You cannot decide to ignore some values and use others.

Please return to page 68/2 and try question 7 again.

34/2

In order to perform this subtraction it is necessary to write the number 6 as 6.00.
You would do best to put 4.73 under the 6.00 with the decimal points in line. If you did that, you probably would not make the mistakes in borrowing which you have made.

This choice is not correct.

Please return to page 69/1 and try question 9 again.

Very good. You made the correct choice. We have to simplify the expression

$$\{21 + 3[9(6 - 4) - 3]\} - 26(8 - 6)$$

We begin by simplifying the expression within the innermost symbol of inclusion. We get

$$\{21 + 3[18 - 3]\} - 26 \times 2$$

We continue by simplifying the expression in the brackets. Thus,

$$\{21 + 3 \times 15\} - 52 =$$
$$\{21 + 45\} - 52 =$$
$$66 - 52 =$$
$$14$$

Please go on to question 17 which follows.

Question 17

Apply the proper principle and simplify the expression,

$$2\{3 + 4[5 + 6(5 + 4 \times \overline{3 + 2})]\}$$

Select the letter which labels the correct statement.

(A) 766

(B) 1246

(C) 716

(D) None of these.

Congratulations!

You did a difficult problem correctly.

We follow the given instructions. The first number doubled is

$$2 \times 2$$

Add 5 and multiplying the result by 5 , yields

$$5(\overline{2 \times 2} + 5)$$

Adding to this, the number on the second die and multiplying the result by 10 yields

$$10\ [5(\overline{2 \times 2} + 5) + 4]$$

Finally, we add the number on the third die and obtain

$$10\ [5(\overline{2 \times 2} + 5) + 5] + 5$$

If we simplify this expression, we get 495 . It is interesting to note that

$$\begin{array}{r} 495 \\ -250 \\ \hline 245 \end{array}$$

That is, if we subtract 250 from the result obtained by following the above instructions; the numbers reading from left to right are the numbers of the dice.

Incidentally, this is the basis for a good trick if you ask a friend to roll a die three times and to follow those instructions and tell you the answer. You can tell him what numbers he rolled by merely subtracting 250 from his answer. The digits will be the numbers in the same order.

You have now finished this segment. Hand in your Punch Card.
You should have entered in your notebook, the following definitions and formulas:

1. Symbols of inclusion are used in mathematics to avoid ambiguity.

2. A number before a symbol of inclusion means that this number multiplies the numbers within the symbol.

3. In simplifying an expression containing more than one symbol of inclusion, we first simplify the innermost symbol.

4. In the absence of symbols, multiplications and divisions are performed from left to right.

You should now be able to complete the following problems from your homework assignment:

Problems 1, 2, 3, and 4 .

$\frac{38}{1}$

Very good. You made the correct choice. We have to simplify the expression

$$\{21 + [12 - 0(8 - 2)]\}$$

Examining the innermost symbols of inclusion, we note that

$$- 0(8 - 2) =$$
$$0$$

since zero times any number is equal to zero.

Thus we have:

$$\{21 + [12 - 0\} =$$
$$\{21 + 12 \} =$$
$$33$$

Please go on to question 15 below.

$\frac{38}{2}$

Question 15

Apply the proper principle and simplify the expression,

$$62 - 2\{39 - [4(7 - 6) + 4(1 + 6)] + 9\}$$

Select the letter which labels the correct statement.

(A) 18

(B) 55

(C) 46

(D) None of these.

Since this letter represents the elements of a set which contains only one element; it is a constant. Of course, you could call it a variable with only one value; but that would not be what the question asked for. You were asked for the one choice which is a variable.

There is a better choice.

Please return to page 62/2 and try question 3 again.

This set is actually a subset of the domain, but we were told that the domain is the set of even integers less than 10.
Therefore, we need the set which contains all such integers.

Please return to page 44/2 and try question 5 again.

VOLUME 2 SEGMENT 2 begins here:

Obtain a Punch Card from your instructor. In addition to the other identifying information that must be furnished by you, you are asked to punch out the following:

COLUMNS				
48	and	50	0 7	(Sequence Number)
54	and	56	0 4	(Type of Punch Card)
60	and	62	0 2	(Volume Number)
66	and	68	0 2	(Segment Number)

Your reading assignment for this Segment is page 35-37 .

Supplementary Notes:

The new methods of indicating multiplication are very important. In the previous segment where you learned to use parenthesis, the point was made that

$3(2 + 4)$ means

multiply 3 by the sum of 2 and 4 . It is not only in this case that the X sign for multiplication is not used. In algebra, we very rarely use the X sign. An obvious reason for this is that we often use the letter x as a variable, and the difference between x and X is difficult to distinguish.

There are two ways we use to indicate multiplications (as your text points out.) The first, and the least used method is the dot. Thus, $5 \cdot 2$ means 5 times 2 and $5a$ means 5 times a . This method might lead to confusion between $5 \cdot 2$ and the decimal 5.2 . If you check carefully, you will see a difference in the height of the dot from the line of print in which it appears.

Please continue on page 41

By far the more important method of showing multiplication of two quantities is to write the quantities next to each other with NO SIGN BETWEEN THEM. Thus 5a or xy indicates a multiplication. But you will notice that two numbers cannot be written in such a way since our number system would cause us to read them as a single number. That is, 1928 does not mean 19 times 28 . We add one detail to avoid this difficulty; we use parenthesis. Thus, (19)(28) would not be a single number. However, since there is no sign between the quantities, this indicates multiplication. Actually, we could do with only one set of parenthesis; the same meaning would exist if we wrote 19(28) or (19)28 . Notice at the bottom of page 36 in your text, we proceed from $\frac{1}{2}$ r to $\frac{1}{2}$ (2) , inserting parentheses when we need them to give meaning to an expression.

You will often be called upon to <u>evaluate</u> an algebraic expression. Remember that in order to do this, you must be given a replacement set (domain) for the variable. Frequently the domain will contain only <u>one</u> element,but this is not always the case.

Did you learn the definition of the word <u>term</u> , as listed in the text on page 37 ? Don't look back just yet. A useful statement concerning terms is:

Any two terms are separated either by a plus sign or a minus sign. Therefore, if an algebraic expression contains no addition or subtraction <u>to separate it into parts</u> it is a single term.

Now you should re-read the book's definition.

Please continue on page 42.

II

42
1

You see that only multiplication (product) or division (quotient) can be involved within a term. Then how can

$$\frac{y - x}{5}$$

be a term as stated on line 6 of page 37 ?

The answer is that the fraction line acts like parentheses so that we have

(y - x) divided by 5

which is one term.

In the same way

$$3(x - y)$$

is one term.

Would you believe that this is one term?

$$\frac{5xy - 7ab + 3w}{2m + p + q}$$

Since this is just one huge division, it is a single term.

Now that you have learned about variables, replacement set, domain, constant, algebraic expression, and so on; you will be asked a series of questions to draw your attention to the more important points.

42
2

Question 1

According to your reading, which statement do you recognize is true?

(A) a variable is a constant

(B) a constant is a variable

(C) a variable has many values

(D) a constant has many values

Since the top of the ladder will slide down the wall, the height, which is represented by b , is not a constant.

Therefore, this choice is not correct.

Please return to page $\frac{51}{2}$ and try question 2 again.

This choice is correct.

Congratulations on handling the decimals correctly.

Please proceed to question 10 which follows.

Question 10

Perform the calculation to evaluate the open expression

$$\frac{x}{y}$$

when x and y have the values 15 and 5 respectively.

(A) 1 and 1

(B) $\frac{1}{3}$

(C) 3

(D) 3 and $\frac{1}{3}$

$\frac{44}{1}$

If the value of an expression can be found merely by performing indicated calculations, it is not an open expression. Since this is merely an addition of two numbers, it is not open.

Then this choice is correct.

Please proceed to question 5 below.

$\frac{44}{2}$

Question 5

If the domain of n is $\{\text{even integers less than } 10\}$ which set do not recognize as the domain?

(A) $\{2, 4, 6, 8\}$

(B) $\{2, 4, 6\}$

(C) $\{2, 4\}$

(D) $\{6\}$

You seem to have missed something which was explained in the text and again in the notes at the beginning of this segment. This choice is not correct. Reread this material.

Please return to page 46/2 and try question 11 again.

The plus sign separates this expression into two parts, each being a term. Therefore, this does not contain only one term.

Please return to page 77/2 and try question 13 again.

Since the domain of w contained two values, the expression

$$2w + 3$$

will also have two values. You have evaluated the expression correctly, and this is the correct choice.

Please proceed to question 8 below.

Question 8

Perform the calculation to evaluate the open expression

$$.3 + x$$

when x has the value 5 .

(A) 8

(B) 5.3

(C) 1.5

(D) .35

Since a constant is defined as a variable which has only a single value, this choice is not correct.

Please return to page 42/2 and try question 1 again.

You weren't thinking when you chose this answer.

What operation is indicated when we write 9w ?

Now you should get the correct answer.

Please return to page 61/2 and try question 12 again.

$\frac{48}{1}$

There are two days in the usual weekend, but that is not what the question asked. Did you remember that domain and replacement set have the same meaning?

Please return to page $\frac{54}{2}$ and try question 6 again.

$\frac{48}{2}$

Have you understood the question correctly? The problem asked you to do one calculation; how do you get two answers?

This choice is not correct.

Please return to page $\frac{43}{2}$ and try question 10 again.

Since R has a replacement set which contains more than one element, R is a variable and not a constant.

Therefore, this choice is correct.

Please proceed to question 4 below.

$\frac{49}{1}$

Question 4

Which do you recognize is NOT an open expression?

(A) $3x$

(B) $2.4n + 9$

(C) $5 + 17.1$

(D) $2p + 2q$

$\frac{50}{1}$

As it stands, the expression has signs which separate it into parts. Each part is called a term .

Therefore, this choice is not correct.

Please return to page $\frac{64}{2}$ and try question 14 again.

$\frac{50}{2}$

The value of the fraction

$$\frac{h - g}{3}$$

must be calculated properly. It calls for a divison by 3 , but the value of the numerator must be divided by the 3 .
Did you do this? Every division calculation has a result. What was the result of your division? You probably made a mistake there; this choice is not correct.

Return to page $\frac{65}{2}$ and try question 16 again.

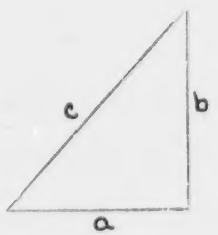
Since a constant is defined as a variable which has only a single value, it is correct to say that a constant is a variable.

Therefore, this choice is correct.

Please proceed to question 2 below.

Question 2

In the diagram c represents the length of a ladder leaning against a wall. The top of the ladder is a distance b above the ground, while the foot (bottom) of the ladder is a distance a from the wall. If the bottom of the ladder is pulled outward from the wall, the top of the ladder will slide down the wall.



Which statement do you recognize is correct?

(A) a , b , and c , are variable: none is constant

(B) a and c are variable; b is constant

(C) b and c are variable; a is constant

(D) a and b are variable; c is constant

$\frac{52}{1}$

In order to find the value of the expression, it is necessary to replace the letter p by its value wherever it appears. Since there are three terms, you must do this for each term, and then add the results. There are three separate parts to the problem, but you appear to have done only a portion of each part. You should notice that the value of p must be the same wherever it appears.

Please return to page $\frac{73}{2}$ and try question 17 again.

$\frac{52}{2}$

It is correct to find the value of each separate quantity in parentheses before doing anything else. However, you appear to have made a mistake, perhaps in not being able to understand what you wrote.

This choice is not correct.

Please return to page $\frac{75}{2}$ and try question 19 again.

Your arithmetic is very good, but you did the wrong calculation.

What operation is involved in

$$.3 \quad + \quad x \quad ?$$

Please return to page $\frac{46}{2}$ and try question 8 again.

The minus sign separates this expression into two parts, each being a term.

Therefore, this choice is not correct.

Please return to page $\frac{77}{2}$ and try question 13 again.

$\frac{54}{1}$

The domain is the set of even integers less than 10 .

Then this choice, which lists the roster of that set, is correct.

Please proceed to question 6 below.

$\frac{54}{2}$

Question 6

If the domain of x is $\{$ weekdays $\}$, choose the number of elements in the replacement set for x .

(A) 7

(B) 5

(C) 2

(D) impossible to tell

Since the bottom of the ladder is being pulled outward from the wall, the distance from the wall; which is represented by a is not a constant.

Therefore, this choice is not correct.

Please return to page 51/2 and try question 2 again.

You have decided correctly that this is a multiplication problem. However, you've mixed up something.

Did you use a rule involving inverting some fraction? There is no such procedure in multiplication; that belongs to a division problem.

Please return to page 66/2 and try question 11 again.

$\frac{56}{1}$

You have become much too generous.

Since the replacement set for w contained the numbers 3 and 12, they should be used for w in the evaluation.

But are they values of the expression

$$2w + 3 \quad ?$$

This choice is not correct.

Please return to page $\frac{68}{2}$ and try question 7 again.

$\frac{56}{2}$

The value of the fraction

$$\frac{h - g}{3}$$

must be calculated properly.

It calls for a division by 3, but the value of the numerator must be divided by the 3. Did you do this? Or did you find a faster way which did not involve getting the value of the numerator first?

You have done something wrong since this choice is not correct.

Please return to page $\frac{65}{2}$ and try question 16 again.

$\frac{57}{1}$

You are quite right in recognizing that there is a calculation which you are to perform, but what operation did you choose? What operation is intended when $9w$ is given?

This choice is not correct.

Please return to page $\frac{61}{2}$ and try question 12 again.

$\frac{57}{2}$

The numerator and the denominator contain the same type of expressions. In each case, it is necessary to find the value of the part in the parentheses before doing anything with the number on the outside.

You appear to have forgotten that and have, therefore, chosen an incorrect answer.

Please return to page $\frac{60}{2}$ and try question 18 again.

$\frac{58}{1}$

Since the replacement set has the same meaning as the domain, you should find this question easy to answer.

You do know the meaning of weekday don't you? It does not mean " days of the week ".

This choice is not correct.

Please return to page $\frac{54}{2}$ and try question 6 again.

$\frac{58}{2}$

Division is an operation which must be done in the order indicated.

Remember that

$$\frac{28}{7} = 4$$

while

$$\frac{7}{28} = \frac{1}{4}$$

This choice is not correct.

Return to page $\frac{43}{2}$ and try question 10 again.

You didn't look very hard, did you?

One of the other choices is correct.

Please return to page 62/2 and try question 3 again.

What does the word respectively mean? It cannot be ignored.

The meaning is: in that order.

Therefore, the value of m is 6 , and the value of h is 5 . You didn't use those values, did you?

In any case, this choice is not correct.

Please return to page 70/2 and try question 15 again.

II

$\frac{60}{1}$

Since there are three different values for p , we begin by evaluating the expression using the first value for p in each term.

This gives us the result

$$3 \cdot 3 \quad + \quad 5 \cdot 3 \quad + \quad 1$$

which equals

$$9 \quad + \quad 15 \quad + \quad 1$$

or

$$25$$

Repeating this process with

$$p \quad = \quad 5$$

we get the value of the expression to be 51 , and using 10 ; we get 151 .

Therefore, this choice is correct.

Proceed to question 18 below.

$\frac{60}{2}$

Question 18

Apply your knowledge to calculate the value of

$$\frac{t\,(\,m \;-\; n\,)}{5\,(\,m \;+\; n\,)}$$

given that $t = 3$

$m = 9$

and $n = 5$

(A) $\frac{11}{25}$

(B) $\frac{6}{25}$

(C) $\frac{11}{35}$

(D) $\frac{6}{35}$

Since 15m means the product of 15 and m , the calculation needed is 15 times $\frac{2}{3}$.

$$\frac{15.2}{3} = \frac{30}{3} = 10$$

Another way to do this is to reduce before multiplying

$$\frac{\overset{5}{\cancel{15}}}{1} \times \frac{2}{\cancel{3}_{1}} = 5 \times 2 = 10$$

Then this choice is correct.

Please proceed to question 12 below.

Question 12

If w is 7 , choose the correct value of $\frac{9w}{5}$

(A) $\frac{97}{5}$

(C) $\frac{54}{5}$

(B) $\frac{16}{5}$

(D) $\frac{63}{5}$

62
1

Since the bottom of the ladder is being pulled outward from the wall, the distance a is variable. Since the top of the ladder is sliding down the wall, the height b is variable. Since the length of the ladder is not changing, the length c is constant.

Therefore, this choice is correct.

Please proceed to question 3 below.

62
2

Question 3

Which one of the following do you recognize as a proper variable?

(A) P , which has an element of $\{ 5 \}$ as its replacement

(B) Q , which has an element of $\left\{ \frac{1}{2} \right\}$ as its replacement

(C) R , which has an element of $\left\{ .3 , 57 , \frac{1}{4} \right\}$ as its replacement

(D) none of these others can be called a true variable.

There seems to be some confusion in your mind about the meaning of

.3 + x

You are instructed to add the values of

.3

and

x

Remember 5 is a whole number. Whole numbers have a decimal, too. 5 is also written as 5 .

When you add decimals, you must align the decimals.

Please return to page 46/2 and try question 8 again.

You have followed the correct process in doing this calculation.

However, this answer is not acceptable. Can you see what is wrong with it?

Please return to page 75/2 and try question 19 again.

$\frac{64}{1}$

Since this expression involves only multiplication of 17 , x and y , it does consist of a single term.

Another way of recognizing it is to notice that there are no plus or minus signs to divide it into parts.

Then this choice is correct.

Please proceed to question 14 below.

$\frac{64}{2}$

Question 14

How many terms do you recognize in the algebraic expression:

$$ax + \frac{3}{x} - 7x \quad ?$$

(A) 1 (C) 3

(B) 2 (D) 4

The word respectively means: in that order.

Then m is 6 and h is 5 .

Now 2m means the product of 2 and m ;

its value is $2 \cdot 6 = 12$

The quantity (h + 7) means the sum of h and 7 ; it is 12 .

Since there was no sign between the 2m and (h + 7) we are to multiply them.

Then we get

$$12 \cdot 12 = 144$$

and this choice is correct.

Please proceed to question 16 below.

$\frac{65}{1}$

Question 16

Apply your knowledge to evaluate the algebraic expression

$$29g + \frac{h - g}{3}$$

when g is 6 and h is 9 .

(A) 174 (C) 177

(B) 175 (D) 181

$\frac{66}{1}$

Since the fraction indicates a division where the numerator is the dividend and the denominator is the divisor, it follows that

$$\frac{15}{5} = 3$$

Then this choice is correct.

Please proceed to question 11 below.

$\frac{66}{2}$

Question 11

Perform the calculation to evaluate the open expression

$$\frac{15m}{}$$

when m is $\frac{2}{3}$

(A) $15\frac{2}{3}$

(B) 10

(C) $\frac{45}{2}$

(D) $\frac{2}{45}$

You seem to have recognized the proper calculation to perform, but your arithmetic is not too good.

You have chosen an incorrect answer.

Please return to page 61/2 and try question 12 again.

Since there are three different values for p , we begin by evaluating the expression using the first value for p in each term. Then we repeat the procedure using the second value for p , and one again for the third.

Your procedure seems to have been correct, but this choice is not correct. Did you interpret each term correctly?

What is the meaning pp , of 5p ?
Perhaps your error occurred here.

Please return to page 73/2 and try question 17 again.

$\frac{68}{1}$

There are five days of the week which we call weekdays.

Therefore, this choice is correct since the replacement set is the domain.

Please proceed to question 7 below.

$\frac{68}{2}$

Question 7

If the replacement set for w is

$$\{3 , 12\}$$

perform the calculation to find the set of values for

$$2w + 3$$

(A) $\{9\}$

(B) $\{27\}$

(C) $\{9 , 27\}$

(D) $\{3 , 9 , 12 , 27\}$

This choice is correct; you did the proper arithmetic.

Proceed to question 9 which follows:

Question 9

Perform the calculation to evaluate the open expression

$$6 - y$$

when y has the value

$$4.73$$

(A) 1.27 (C) 2.37

(B) 1.37 (D) 2.73

You have done an excellent job, and your arithmetic is correct.

However, you seem to have the problem in reverse. The set you were given was not the replacement set for x, but for the expression

$$5x - 2$$

Therefore, this choice is not correct.

Please return to page $\frac{79}{2}$ and try question 20 again.

Since the plus sign separates terms, and the minus sign also separates terms; we have a total of three terms in this expression.

Therefore, this choice is correct.

Please proceed to question 15 below.

Question 15

Perform the calculation to evaluate

$$2m (h + 7)$$

when m and h are 6 and 5 respectively.

(A) 144 (C) 312

(B) 130 (D) 325

One of the other choices is correct.

Be sure to do your work carefully. Line up each step and perform each substitution one under the other.

Please return to page $\frac{75}{2}$ and try question 19 again.

When two or more numbers are multiplied, each of the numbers is called a factor of the product.

Thus, for example;

4 and 7 are factors of 28 , and 2 , 3 , 3 , are factors of 18 .

Please return to page $\frac{81}{1}$ and try this question again.

$\frac{72}{1}$

Sorry, but the set you chose does not list <u>all</u> the integral factors of 28 .

Please return to page $\frac{118}{1}$ and try this question again.

$\frac{72}{2}$

Let us have a clear meaning of the word coefficient of a term.

Consider, for example, the term $8abc$:

The factors of this term are 8 , a , b , and c . Each of these factors is the coefficient of the product of the other factors.

Thus, 8 is the coefficient of abc ;

bc is the coefficient of $8a$;

and $8c$ is the coefficient of ab , etc.

Please return to page $\frac{90}{2}$ and try this question again.

The value of 29g is, of course, the value of 29 times 6 ; or 174 .

In order to get the value of the fraction, we first get the value of h - g , which is 3 . Then 3 divided by 3 is 1 . Now we add the 174 and 1 to get the final result 175 .

Therefore, this choice is correct.

Please proceed to question 17 below.

Question 17

If p is an element of

$$\{ 3 , 5 , 10 \}$$

apply your knowledge to find the set of values for the expression

$$pp + 5p + 1$$

(A) $\{ 9 , 25 , 10 \}$

(B) $\{ 25 , 51 , 151 \}$

(C) $\{ 18 , 36 , 116 \}$

(D) none of these

$\frac{74}{1}$

A prime factor is a factor that is divisible only by itself and 1 .

Thus, for example, 7 and 3 are prime factors of 21 since

$$7 \times 3 = 21$$

and both 7 and 3 are numbers which are exactly divisible only by themselves and 1 .

Please return to page $\frac{111}{2}$ and try this question again.

$\frac{74}{2}$

Sorry, but your choice is not correct.

To obtain a number when its factors are given, we multiply the given factors. Their product is the required number. You should also keep in mind that

$$1 \times 1 = 1 \quad \text{and}$$

$$1 \times 1 \times 1 = 1$$

That is, no matter how many times 1 is multiplied by itself, the product is 1 .

Please return to page $\frac{100}{2}$ and try this question again.

In the numerator and in the denominator you meet the same type of expression. The part in parentheses must be calculated first, then you can proceed with the rest.

The calculation looks like this:

$$\frac{t\,(m - n)}{5\,(m + n)} = \frac{3\,(9 - 5)}{5\,(9 + 5)}$$

$$= \frac{3\,(4)}{5\,(14)}$$

$$= \frac{12}{70}$$

$$= \frac{6}{35}$$

Therefore, this choice is correct.

Please proceed to question 19 below.

Question 19

If the area of a ring is

$$\pi\,(R + r)(R - r)$$

apply your knowledge to find the area when

$$\pi = \frac{22}{7}$$

$$R = 10$$

$$r = 4$$

(A) 264

(B) 572

(C) $\frac{22}{7}\,(84)$

(D) none of these

$\frac{76}{1}$

15m does mean that 15 multiplies m .

However, 15 can be written as $\frac{15}{1}$. When it multiplies a fraction the 15 remains in the numerator and multiplies the numerator of the other fraction.

Please return to page $\frac{66}{2}$ and try question 11 again.

$\frac{76}{2}$

What is the meaning of 2m ? It does not mean the value of 2 followed by the value of m . There is a specific calculation you are to do. If necessary, reread the text and your notes; this choice is not correct.

Please return to page $\frac{70}{2}$ and try question 15 again.

This choice is correct.

You have decided correctly that this problem calls for multiplication since there is no sign between the 9 and the w . Your arithmetic is good; the 5 does not divide into 63 evenly.

The answer is left in improper fraction form.

Please proceed to question 13 below.

Question 13

Which choice do you recognize contains exactly one term?

(A) f + m

(B) 1 + m

(C) 17xy

(D) 2x - y

78/1

Since p is an element of a set containing three elements, it is necessary to use each value for p . If you start with the first value for p and use it to get the value of each term and then add the three terms together, you will have the first value for the expression. Then it will be necessary to do the same thing over using the second value for p , and once more using the third value.

If you do this, you should find that one of the other choices is correct.

Please return to page 73/2 and try question 17 again.

78/2

If two or more numbers (or expressions) are multiplied, each one is a factor of the product. To obtain the number when its factors are given, we multiply the given factors. A number is equal to the product of its factors.

Please return to page 104/1 and try this question again.

Substituting the values given (be sure to note the difference between R and r), we get:

$$(R + r)(R - r) = \frac{22}{7}(10 + 4)(10 - 4)$$

$$= \frac{22}{\cancel{7}_{1}} \left(\frac{\overset{2}{\cancel{14}}}{} \right) (6)$$

$$= 22(12)$$

$$= 264$$

Therefore, this choice is correct.

Please proceed to question 20 below.

Question 20

If the open expression

$$5x - 2$$

has the values which are elements of

$$\{8, 13, 18\}$$

apply your knowledge to find the domain of x .

(A) $\{38, 63, 88\}$

(B) $\left\{\frac{6}{5}, \frac{11}{5}, \frac{16}{5}\right\}$

(C) $\{3, 4, 5\}$

(D) $\{2, 3, 4\}$

VOLUME 2 SEGMENT 3 begins here:

Obtain a Punch Card from your instructor. In addition to the other identifying information that must be furnished by you, you are asked to punch out the following:

COLUMNS	48	and	50	0 8	(Sequence Number)
	54	and	56	0 4	(Type of Punch Card)
	60	and	62	0 2	(Volume Number)
	66	and	68	0 3	(Segment Number)

Your reading assignment for this segment is page 40 .

Introductory Note

Every human activity such as business, science or sports, has a language of its own with certain words having special meanings. Similarly, mathematics has a vocabulary of its own where certain words have a special meaning. Just as you cannot be a good football player without knowing the vocabulary of this sport, you cannot be a good student of algebra without a knowledge of its vocabulary.

In this segment, you will learn the meaning of such words as factor, coefficient, exponent and base. Your mathematical vocabulary will be enriched to help you become a better student of algebra.

You will now be asked a series of questions to draw your attention to the more important points.

Question 1 is on page 81
1

Question 1

Apply the proper principle and select the letter which correctly completes the statement:

A pair of factors of 30 is,

(A) 3 and 27

(B) 15 and 15

(C) 6 and 5

(D) 3 , 5 , and 2

We do not agree. Set S is defined by the roster method.

Thus, the number whose factors are

4 , 5 , 5 , 7 is

4 x 5 x 5 x 7

The other two sets are defined by a rule. Please list the elements of each of these two sets and then multiply them.

Please return to page $\frac{86}{2}$ and try this question again.

$\frac{82}{1}$

Did you examine every member of the set you chose? If you do, you will notice that 3 is not a factor of 28 . The number 3 does not divide 28 exactly.

Please return to page $\frac{118}{1}$ and try this question again.

$\frac{82}{2}$

Please write the following definition in your notebook:

A base is a number raised to a power, which is indicated by an exponent. The exponent indicates how many times the base is used as a factor.

In 8^3 , the base 8 is used three times as a factor.

Please return to page $\frac{113}{1}$ and try this question again.

You understood the problem although it was set up in reverse order, but you have a mistake somewhere since this choice is not correct.

Please return to page $\frac{79}{2}$ and try question 20 again.

If the factors of a number are listed as 1 , 2 , 5 , and 5 , all three of the factors must be multiplied; i.e.,

$$2 \times 5 \times 5 = 50$$

It is true that the divisors of 50 other than itself are only

1 , 2 , and 5

Please return to page $\frac{100}{2}$ and try question 5 again.

$\frac{84}{1}$

The number 15 is not a prime factor because 15 can be divided exactly by 5 and by 3 .

A prime factor is a number divisible only by itself and by 1 .

Please return to page $\frac{111}{2}$ and try this question again.

$\frac{84}{2}$

Sorry, but your choice is not correct.

Each factor of a product is the coefficient of the product of the remaining factors. Think of the number

$$\frac{5}{6}\,xyz$$

as the product of

$$\frac{5}{6}\ ,\ x\ ,\ y\ ,\ \text{and}\ z$$

Please return to page $\frac{99}{2}$ and try this question again.

$\frac{85}{1}$

Almost right. In the term $39y$, 39 is the coefficient; and y is the base. But the exponent of y is not zero.

Ask yourself;

How many times is y used as a factor in the term $39y$?

Please return to page $\frac{97}{2}$ and try this question again.

$\frac{85}{2}$

Sorry, but we do not agree.

The square of a number means that number multiplied by itself.

Thus, for example, the square of 8 means

$$8 \times 8$$

and the square of $3y$ means

$$(3y)(3y)$$

Please return to page $\frac{110}{2}$ and try this question again.

Very good. You made the correct choice. It is necessary to have a clear idea of the meaning of the word coefficient. Each factor of a product is the coefficient. Each factor of a product is the coefficient of the product of the remaining factors.

Thus,

$27xy$ has the factors

27, x, and y

The coefficient of x is the product of the remaining factors

27 and

y

Please go on to question 7 which follows.

Question 7

Apply the proper principle and select the letter which correctly answers the following question:

The elements of the following sets are factors of a number. Which set represents the largest number?

$S = \{4, 5, 5, 7\}$

$T = \{$The set of all natural numbers less than 7$\}$

$U = \{$The set of positive whole numbers divisible by 5 and less than 20 .$\}$

(A) Set S

(B) Set T

(C) Set U

(D) Sets S and U are equal.

It appears that you interpreted the problem correctly and found values that you felt could be substituted for x that would produce the given set of values.

But you evidently made a mistake in solving the equation. This could have been detected by substituting your answer in the original open expression.

Please return to page 79/2 and try question 20 again.

The expression "the cube of x" or "x cubed" means

$$x \cdot x \cdot x$$

Since the factor x is used three times, we write

$$x^3$$

Please return to page 115/2 and try this question again.

$\frac{88}{1}$

We do not agree.

What is the product of 9 and 6 ? When we multiply two letters, say a and b ; we write their product as ab . But in the decimal system

96 means 90 + 6 and not

9 x 6

Please return to page $\frac{104}{1}$ and try this question again.

$\frac{88}{2}$

You are being introduced to the language of algebra. It is very important that you get off to a good start. Recall when you worked with parentheses, you first simplified the innermost symbols of inclusion. Similarly, in the expression the square of the sum of x and y , you first take the sum of x and y and then square that sum.

Please return to page $\frac{122}{2}$ and try this question again.

In order for

$$5x - 2$$ to have

the value 8 , x must be 2 .

If x is 3 , the value of

$$5x - 2 \text{ is } 13$$

and $x = 4$

makes $5x - 2$

equal to 18

Therefore, the domain of x is

$$\{2 , 3 , 4\}$$

This choice is correct.

You have now finished this Segment. Hand in the PUNCH CARD.

You should have entered in your NOTEBOOK the following:

Variable - a symbol which represents any of the members of a replacement set.

Constant - a variable with a single member in its replacement set.

Domain - the replacement set for a variable.

Term - an expression which is not separated into parts by either plus or minus signs.

Algebraic expression - an expression containing either variables or constants or both.

You should now be able to complete assignment 2 , examples 5 - 8.

II

$\frac{90}{1}$

Very good.

You made the correct choice.

To find a number when its factors are known, we multiply all the factors.

Thus, we have

$$1 \times 3 \times 3 \times 8 \times 1 = 72$$

Note that one times a number equals the number.

Please go on to question 6 which follows.

$\frac{90}{2}$

Question 6

Apply the proper principle and find the coefficient of x in the term

$$27xy$$

Select the letter which labels the correct statement.

(A) 27

(B) $27 + y$

(C) $27y$

(D) $(2)(7)y$

We do not agree.

If 15 and 15 were the factors of a number that number would equal

$$15 \times 15 = 225$$

The factors of a given number are those numbers whose product is equal to the given number.

Please return to page 81/1 and try this question again.

The numerical coefficient of a term is the numerical part of the term. Thus for example, in the term

$$6y^2$$

6 is the numerical coefficient.

Please return to page 113/1 and try this question again.

92
1

Is 18 a factor of 28 ?

No. 18 does not divide 28 without a remainder.

Please reconsider your choice.

Please return to page 118 and try this question again.
1

92
2

How would you express in words, the choice you made? The answer is:

one-fifth times y , times the square of x .

Is this the same as the question?

No.

Please reconsider your choice.

Please return to page 110 and try this question again.
2

We do not agree.

The coefficient of $39y$ is not 3.

Note that $39y$ is the product of 39 and y. Furthermore, the exponent indicates how many times a factor is used. Now, y is a factor of $39y$; how many times is this factor used?

Please return to page 97/2 and try this question again.

Recall your work with parentheses. We first write the expression within a parenthesis as a single number. Thus,

$$(3a - 2b) =$$

$$(3 \cdot 4 - 2 \cdot 3) =$$

$$(12 - 6) =$$

$$6$$

Proceed in the same manner for the parenthesis in the denominator.

Please return to page 107/2 and try this question again.

$\frac{94}{1}$

Please note that the set of prime numbers is

$$2 \ , \ 3 \ , \ 5 \ , \ 7 \ , \ 11 \ , \ 13 \ , \ 17 \ , \ . \ . \ .$$

The natural number 1 is not a member of this set.

The smallest prime number is 2 .

Please return to page $\frac{111}{3}$ and try this question again.

$\frac{94}{2}$

Please note that 1 is a factor of every term.

Thus, for example,

x^2y means

$1 \cdot x^2 \cdot y$

That is, the coefficient of

x^2y is

1

Please return to page $\frac{99}{2}$ and try this question again.

There is a difference between the expression

8 times the cube of x

and 8x cubed

The first means $8 \cdot x \cdot x \cdot x$

while the second means $(8x)(8x)(8x)$

Please return to page $\frac{115}{2}$ and try this question again.

Sorry, but we don't agree.

Begin as follows:

$$S = 4 \pi r^2$$

$$\pi = \frac{22}{7}$$

$r = 3\frac{1}{2}$ Note only the r is squared.

Change $3\frac{1}{2}$ to $\frac{7}{2}$ and write

$$S = 4 \cdot \frac{22}{7} \cdot \frac{7}{2} \cdot \frac{7}{2}$$

Perform the indicated operations.

Please return to page $\frac{112}{2}$ and try this question again.

II

96
1

Very good. You made the correct choice.

The sentence is:

The square of x and y .

First we express the sum of x and y ; namely,

$$(x + y)$$

Then, we square that sum.

The square of

$$(x + y) \quad \text{is}$$

$$(x + y)^2$$

Please go on to question 14 below.

96
2

Question 14

Apply the proper principle and find the value of the expression,

$$(6x)^2$$

when

$$x = 3$$

Select the letter which labels the correct statement.

(A) 81 (C) 54

(B) 36 (D) 324

Very good. You made the correct choice.

In the term

$$7s^3$$

7 is the coefficient. The letter s is the base, and the small number to the right and above s is the exponent.

The number $7s^3$ is the product of the factors

$$7 \ , \ s \ , \ s \ , \ s$$

Please go on to question 10 below.

Question 10

Apply the proper principle and name the numerical coefficient, base, and exponent of the term

$$39y$$

Select the letter which labels the correct statement.

(A) 39 is the coefficient, y is the base, and zero is the exponent.

(B) 39 is the coefficient, y is the base, and 1 is the exponent.

(C) 3 is the coefficient, 9 is the base, and y is the exponent.

(D) 3 is the coefficient, 9y is the base, and 1 is the exponent.

$\frac{98}{1}$

The factors of an expression are numbers or letters that multiply to produce that expression;

for example, the factors of $15x$ are

$$3 \ , \ 5 \ , \ \text{and} \ \ x$$

Please return to page $\frac{104}{1}$ and try this question again.

$\frac{98}{2}$

The procedure that we follow in evaluating an expression is:

Replace the letter by the given value of this letter.

Thus, for the expression

$$y^3 + 3y^2 - 8y \quad \text{when}$$

$$y = 2 \quad \text{we write}$$

$$2^3 + 3 (2^2) - 8 (2)$$

Please continue.

Please return to page $\frac{116}{2}$ and try this question again.

Very good. You made the correct choice.

Let us first write each set with its elements enumerated.

Thus, $S = \{4, 5, 5, 7\}$

$T = \{1, 2, 3, 4, 5, 6\}$

$U = \{5, 10, 15\}$

Now,

$4 \times 5 \times 5 \times 7 = 700$

$1 \times 2 \times 3 \times 4 \times 5 \times 6 = 720$

$5 \times 10 \times 15 = 750$

Hence, the number whose factors are the elements of set U is the largest number.

Please go on to question 8 below.

Question 8

Apply the proper principle and select the letter which labels a correct statement.

(A) The coefficient of yz of the term $\frac{5}{6}$ xyz is $\frac{5}{6}$

(B) The coefficient of ab of the term ab is ab .

(C) The coefficient of p of the term $\frac{3}{4}$ pqr is $\frac{3}{4}$ qr .

(D) The coefficient of $\frac{x}{y}$ of the term $\frac{7x}{y}$ is 7y .

100
1

Very good. You made the correct choice.

In enumerating all the factors of a number, we must include 1 and the number itself. One is an integral factor of every number. Furthermore, every number divided by itself, equals 1. Thus, every number is a factor of itself.

Please go on to question 5 below.

100
2

Question 5

Apply the proper principle and find the number whose factors are,

1, 3, 3, 8, 1

Select the letter which labels the correct statement.

(A) 16

(B) 73

(C) 24

(D) 72

Please read the question carefully.

The question calls for a pair of factors of 30 . A pair means 2 .

Please return to page 81/1 and try this question again.

The exponent is the number that is written small to the right and above the base. The exponent indicates how many times the base is used as a factor.

Thus, for example, in the term

$$25x^4$$

25 is the coefficient, x is the base, and 4 is the exponent.

Please return to page 113/1 and try this question again.

$\frac{102}{1}$

We don't agree.

One of the letters does have the correct answer next to it.

Please reconsider your choice.

Please return to page $\frac{115}{2}$ and try this question again.

$\frac{102}{2}$

If the question called for the square of $\frac{1}{5}xy$, then your choice would be correct.

However, the question asked for

$\frac{1}{5}$ the square of xy

Do you see the difference?

Please return to page $\frac{110}{2}$ and try this question again.

Evaluating formulas is of great practical value. It is, therefore, important that you learn how to perform this operation. A formula expresses a rule for determining a quantity when other related quantities are known.

Thus, for example;

the formula $A = bh$

expresses the area of a rectangle in terms of its base b and its height h. If we know the value of b and of h, the formula tells us how to find the area.

Now, the formula $S = 4 \pi r^2$

expresses the surface area of a sphere of radius r. To determine S, we replace the letters by the given values.

Thus, we get

$$S = 4 \cdot \frac{22}{7} \cdot \frac{7}{2} \cdot \frac{7}{2}$$

Note that we changed $3\frac{1}{2}$ to

$$\frac{7}{2}$$

We divide the numerator and denominator by 4 and by 7.

We get

$$22 \cdot 7 = 154$$

Please go on to question 18 below.

Question 18

Apply the proper principle and find the value of T in the formula

$$T = \frac{n}{6}(2n + 1)(n + 1) \quad \text{if}$$

$$n = 7$$

Select the letter which labels the correct statement.

(A) $T = \frac{280}{3}$ (C) $T = \frac{840}{6}$

(B) $T = 140$ (D) $T = \frac{161}{6}$

$\frac{104}{1}$

This is the correct answer.

Now proceed to question 3 which follows.

Question 3

Apply the proper principle and find the expression whose factors are

$$9 \ , \ 6 \ , \ \pi \ , \text{ and } \ r$$

Select the letter which labels the correct statement.

(A) $15 \pi r$

(B) $96 \pi r$

(C) $54 \pi r$

(D) $9 + 6 + \pi + r$

$\frac{104}{2}$

We do not agree.

The term $\frac{7x}{y}$

is the product of 7 and $\frac{x}{y}$

Please return to page $\frac{99}{2}$ and try this question again.

Sorry, but your choice is not correct. $\frac{105}{1}$

The coefficient of

$$39y \quad \text{is} \quad 39$$

Please keep in mind that the number 39 is equal to 30 + 9 and is not equal to the product of 3 and 9 .

Please return to page $\frac{97}{2}$ and try this question again.

Sorry, but we do not agree. $\frac{105}{2}$

If we are asked to evaluate an expression containing one or more letters, we replace the letters by the given values and then perform the indicated operations.

Suppose, for example, if we were asked to evaluate the expression

$$(2y)^3 \quad \text{when}$$

$$y = 2$$

We proceed by replacing the letter

$$y \quad \text{by} \quad 2$$

Thus, we have

$$(2 \times 2)^3$$

Now $2 \times 2 = 4$

and $4^3 =$

$$4 \times 4 \times 4 =$$

64

Please return to page $\frac{96}{2}$ and try this question again.

II

106/1

Sorry, but we do not agree.

The expression

$$(x + y + z)^3$$

is not the same as

$$x^3 + y^3 + z^3$$

The first of these expressions is the cube of the sum of

$$x \text{ , } y \text{ , and } z$$

The second expression is the sum of the cubes of

$$x \text{ , } y \text{ , and } z$$

Do you see the difference?

Please return to page 123/2 and try this question again.

106/2

Sorry! We disagree.

An algebraic sentence is limited to certain symbols.

Please go back to your textbook, study them and copy them into your notes along with their meanings.

Please return to page 121/2 and try question 1 again.

Very good. You made the correct choice.

In evaluating an expression, we first replace the letter by its given value. Thus, we get

$$2^3 + 3(2^2) - 8(2)$$

Note carefully that all we did was to replace the letter y by 2.

Now, we perform the indicated operations.

$$2^3 = 2 \cdot 2 \cdot 2 \cdot = 8$$

$$3(2^2) =$$

$$3(2 \cdot 2) =$$

$$3 \cdot 4 = 12$$

and $8(2) = 16$

We now have $8 + 12 - 16 =$

$$20 - 16 = 4$$

Please go on to question 16 below.

Question 16

Apply the proper principle and find the value of the expression

$$\frac{(3a - 2b)^2 + c^2}{a^3 - (b - c)^4}$$

when

$a = 4$

$b = 3$

$c = 1$

Select the letter which labels the correct statement.

(A) $\frac{13}{4}$

(B) $\frac{19}{24}$

(C) $\frac{37}{48}$

(D) None of these.

You evidently didn't read all of the choices.

Yes, II is an algebraic sentence, but it is not the only one of those statements that is an algebraic sentence.

Please return to page 126/2 and try question 2 again.

What member of the domain is x representing in this sentence?

If x is not specified, then any element of the domain can be substituted. In order for open sentence to be true, all members of the domain must be considered. If even only one member makes the sentence false; then the open sentence can't be said to be true.

Is the product of 4 and 3 divisible by 8 ?

Please return to page 124/2 and try question 2 again.

Did you first simplify the expressions within the parentheses?

Write each of the expressions within the parentheses as one number.

Thus, for example,

$$(2n + 1) =$$

$$(2 \cdot 7 + 1) =$$

$$(14 + 1) = 15$$

Please continue.

Please return to page 103/2 and try this question again.

Sorry, but we do not agree. How did you proceed? The first thing to do is to replace each of the letters

$$x , y , z$$

by the given values of these letters.

If you do this, you get

$$10 [5 (2 \cdot 3 + 5) + 4] + 5$$

Now recall your work with symbols of inclusion. The rule is to simplify the innermost symbol first.

Please continue.

Please return to page 129/2 and try this question again.

$\frac{110}{1}$

Very good. You made the correct choice.

The expression

8 times the cube of x

means the product of

8 , x , x , x

The cube of x means that the base x is used three times as a factor.

Please go on to question 12 which follows.

$\frac{110}{2}$

Question 12

Apply the proper principle and re-write the expression

one-fifth the square of xy

in a shorter form.

Select the letter which labels the correct statement.

(A) $\frac{1}{5} xy^2$ (C) $\frac{1}{5} (xy)^2$

(B) $\frac{1}{5} x^2y$ (D) $(\frac{1}{5} xy)^2$

Very good. You made the correct choice. The numbers 6 and 5 are a pair of factors of 30 , since

$$6 \times 5 = 30$$

It should be noted that there are other sets of numbers that are factors of 30 . Thus, for example, 3 and 10 are also a pair of factors of 30 .

Please go on to question 2 below.

Question 2

Apply the proper principle and find the prime factors whose product is 45 . Select the letter next to the correct statement.

(A) 9 and 5

(B) 15 and 3

(C) 45 and 1

(D) 3 , 3 , and 5

Very good. You made the correct choice.

In evaluating a more complicated expression, we must proceed systematically.

First, we work with the numerator,

$$(3a - 2b)^2 + c^2$$

For

$$a = 4$$
$$b = 3$$
$$c = 1$$

the expression in the parenthesis equals

$$(12 - 6)^2 = 62$$
$$= 36$$

and $c^2 = 12$

$$= 1$$

Thus, the numerator equals 37 . In the denominator, we have

$$4^3 - (3 - 1)^4 =$$
$$64 - 2^4 =$$
$$64 - 16 = 48$$

Thus, the answer is $\frac{37}{48}$.

Please go on to question 17 below.

Question 17

Apply the proper principle and find the value of S in the formula

$$S = 4 \pi r^2$$

where $\pi = \frac{22}{7}$

and $r = 3 \frac{1}{2}$

Select the letter which labels the correct answer.

(A) 154 (C) 88

(B) 44 (D) 1936

This is the correct answer.

Please go on to question 9 which follows.

Question 9

Apply the proper principle and name the numerical coefficient, base, and exponent of the term

$$7s^3$$

Select the letter which labels the correct statement.

(A) 7 is the coefficient, 3 is the base, and s is the exponent.

(B) s is the coefficient, 7 is the base, and 3 is the exponent.

(C) s is the coefficient, 3 is the base, and 7 is the exponent.

(D) 7 is the coefficient, s is the base, and 3 is the exponent.

You made a mistake. Did you first write each of the expressions in the parentheses as one number? Let us do so now.

$$(x + y + z)^3$$

when $x = 2$

$y = 2$

$z = 1$

is the same as $(2 + 2 + 1)^3 =$

$53 =$

$5 \quad 5 \quad 5 =$

125

Please continue.

Please return to page 123/2 and try this question again.

II

114
1

Yes, but you can express your answer in a simpler form. Does 6 divide 840 exactly? Please find out.

Please return to page 103 and try this question again.
2

114
2

Sorry, we disagree. What is an open sentence? Is it true or false?

Please return to page 146 and try question 3 again.
2

Very good. You made the correct choice.

In the term

$$39y$$

39 is the coefficient, and y is the base.

The question is: What is the exponent?

If we look at the term

$$39y$$

we do not see an exponent. When there is no visible exponent, the exponent is 1 .

Thus, $39y$ could have been written as $39y^1$

In other words, the base y was used only once as a factor. When the base is used once, the exponent is omitted.

Please go on to question 11 below.

Question 11

Apply the proper principle and re-write the expression:

eight times the cube of x

in a shorter form.

Select the letter which labels the correct statement.

(A) $8x^3$ (C) $(8x)^3$

(B) $8(3x)$ (D) None of these.

116
1

Very good. You made the correct choice.

In order to evaluate an expression, we replace the letter by the given value of this letter. Thus, we replace

x by 3 in

$(6x)^2$

We get $(6 \cdot 3)^2 =$

$18 \cdot 18 =$

324

Please go on to question 15 below.

116
2

Question 15

Apply the proper principle and find the value of the expression

$$y^3 + 3y^2 - 8y$$

when $y = 2$

Select the letter which labels the correct statement.

(A) 2

(B) 4

(C) 10

(D) 3

You were asked to evaluate the expression

$$y^3 + 3y^2 - 8y$$

when

$$y = 2$$

We substitute

$$(2)^3 + 3(2)^2 - 8(2) =$$

$$8 + 3(4) - 16 =$$

$$8 + 12 - 16 =$$

$$4$$

Your answer choice is correct.

Now proceed to question 16 below.

Question 16

Apply the proper principle and find the value of the expression

$$\frac{(3a - 2b)^2 + c^2}{a^3 - (b - c)^4}$$

when

$$a = 4$$

$$b = 3$$

$$c = 1$$

Select the letter which labels the correct statement.

(A) $\frac{13}{4}$ (C) $\frac{37}{48}$

(B) $\frac{19}{24}$ (D) None of these.

118
1

This is the correct answer.

Please go on to the next question.

Question 4

Apply the proper principle and select the letter next to the set whose members consist of all the integral factors of 28 .

(A) { 2 , 4 , 7 , 14 }

(B) { 2 , 3 , 4 , 7 , 12 }

(C) { 2 , 4 , 7 , 14 , 18 }

(D) { 1 , 2 , 4 , 7 , 14 , 28 }

118
2

It's easy to be careless. Check all of the answers before you make a decision. Yes, I is an algebraic sentence, but it is not the only one of those statements that is an algebraic sentence.

Please return to page 126/2 and try question 2 again.

We don't agree.

Let us do a similar problem together.

Find the value of

$$\frac{2p}{5}(3p + 1)(2p + 1)$$

We first simplify the expressions within the parentheses and write each one as a single number.

Thus, $(3p + 1) =$

$3 \cdot 3 + 1 =$

$9 + 1 = 10$

and

$(2p + 1) =$

$2 \cdot 3 + 1 = 7$

Now we have

$\frac{6}{5}(10)(7) =$

$6(2)(7) = 84$

Please return to page 103/2 and try this question again.

The expression within the brackets does not equal one.

Please proceed as follows:

Replace each of the letters by the given numbers and write the numbers inside the parentheses as one number.

Please return to page 123/2 and try this question again.

II

Congratulations! You did a pretty difficult problem correctly.

Surely you must have followed this procedure:

You replaced the letters

$$x \ , \ y \ , \ z$$

by their given values,

$$x = 3$$

$$y = 4$$

$$z = 5$$

We obtain

$$10 \ [\ 5 \ (\ 2 \ \cdot \ 3 \ + \ 5 \ ) \ + \ 4 \ ] \ + 5$$

Now we simplify the numbers within the innermost symbol of inclusion.

Thus we get,

$$10 \ [\ 5 \ (\ 11 \ ) \ + \ 4 \ ] \ + \ 5 =$$

$$10 \ [\ 55 \ + \ 4 \ ] \ + \ 5 =$$

$$10 \ [\ 59 \ ] \ + \ 5 =$$

$$595$$

Since this was not one of the choices offered, the correct answer is "none of these."

You have now finished this segment. Hand in your Punch Card. You should have entered in your notebook the following definitions and formulas:

Definitions of <u>factor</u>, <u>coefficient</u>, <u>base</u>, and <u>exponent</u>.

You should now be able to complete the following problems from your Homework Assignment: Problems 9, 10, 11, and 12 .

VOLUME 2 SEGMENT 4 begins here:

Obtain a PUNCH CARD from your instructor. In addition to the other identifying information that must be furnished by you, you are asked to punch out the following:

COLUMNS	48 and 50	0 9	(Sequence Number)
	54 and 56	0 4	(Type of Punch Card)
	60 and 62	0 2	(Volume Number)
	66 and 68	0 4	(Segment Number)

Your READING ASSIGNMENT for this segment is pg: 44 - 46 .

In the previous segments you have learned about the parts that make up algebraic expressions. Among them are: variable, constant, factor, coefficient, base, exponent, and the elements of sets.

You will now investigate how these parts are assembled into algebraic sentences, and how certain operations can be performed on them.

You will now be asked a series of questions to draw your attention to the more important points.

Question 1

Recognize the statement below that is an algebraic sentence.

(A) $3x \overset{*}{*} 5$

(B) $6y \geq 12$

(C) $2x \ \# \ 6$

(D) $5y \ ¢ \ 9$

122
1

Very good. You made the correct choice.

We want to write the expression

$\frac{1}{5}$ the square of xy

This means that only the expression xy is squared.

Thus, we have

$\frac{1}{5}(xy)^2$

as our answer.

Please go on to question 13 below.

122
2

Question 13

Apply the proper principle and re-write the expression:

the square of the sum of x and 5

in a shorter form.

Select the letter which labels the correct statement.

(A) $x^2 + 25$

(B) $(x + 5)^2$

(C) $(5x)^2$

(D) $5 + x^2$

Very good. You made the correct choice.

We have $T = \frac{n}{6}(2n + 1)(n + 1)$

and

$n = 7$

We first write each of the expressions within the parentheses as a single term.

We get $2n + 1 =$

$2(7) + 1 =$

$14 + 1 =$

15

We now can write $\frac{7}{6}(15)(8) =$

$\frac{7(120)}{6} =$

$7(20) =$

140

Please go on to question 19 below.

Question 19

Apply the proper principle and find the value of the expression

$$\frac{1}{3}\left[(x + y + z)^3 - (x^3 + y^3 + z^3)\right]$$

if

$x = 2$

$y = 2$

$z = 1$

Select the letter which labels the correct statement.

(A) 0 (C) 36

(B) $\frac{110}{3}$ (D) $\frac{1}{3}$

124
1

Your answer is correct. An open sentence is one containing a variable, and thus one which is neither true nor false; but "open."

If a sentence does not contain a variable, it is not an open sentence.

Please go on to question 4 below.

124
2

Question 4

Using your knowledge of open sentences, choose the letter below that best describes the following statements:

I. The product of 3 and 12 is divisible by 9 .

II. The product of 4 and x is divisible by 8 .

(A) Both I and II are true sentences.

(B) I is a true statement, but II is neither true or false.

(C) Both I and II are false sentences.

(D) II is a true statement, but I is neither true nor false.

Have you forgotten what an open sentence is? We said that an open sentence is a sentence containing a variable. Look at the statements again, then please select another choice.

Please turn to page 143/2 and try question 5 again.

Sorry, we don't agree. What is the smallest multiple of 3 and 2 ?

Please return to page 154/2 and try question 7 again.

Very good! Statement B says:

" 64 is greater than or equal to 12 ."

It is an algebraic sentence because it relates two algebraic expressions using one of the accepted symbols.

Please go on to question 2 below.

Question 2

Choose the letter below that correctly describes the following statements:

I. $7 \neq 13x + 5$

II. $5 = 4a - 1$

III. $x + 5 > (3x - 4) \div 9$

(A) Only II is an algebraic sentence.

(B) Only I is an algebraic sentence.

(C) Only III is an algebraic sentence.

(D) All three are algebraic sentences .

Consider each answer choice before making a decision.

Did you read the problem carefully?

Statement III is an open sentence because it contains a variable and an algebraic verb, "less than."

Please return to page 149/2 and try question 6 again.

Did you test each of the elements in your solution set in the original problem? The product of two even numbers is an even number, not an odd number.

Please return to page 151/2 and try question 9 again.

II

128/1

It's easy to be careless, but better to be careful.

What is the product of 3 and 12 ? Can you divide 4 and 36 ?

Can you divide 36 by 9 ?

Please return to page 124/2 and try question 4 again.

128/2

Did you misread a symbol?

Please go back and check if you should have added or subtracted.

Please return to page 148/2 and try question 11 again.

Very good. You made the correct choice.

We have to evaluate the expression

$$\frac{1}{3}\ [\ (\ x\ +\ y\ +\ z\ )^3\ -\ (\ x^3\ +\ y^3\ +\ z^3\ )\ ]$$

when

$$x = 2$$

$$y = 2$$

$$z = 1$$

We first replace each of the letters by the given numbers. We have

$$\frac{1}{3}\ [\ (\ 2\ +\ 2\ +\ 1\ )\ -\ (\ 2^3\ +\ 2^2\ +\ 1^3\ )\ ]$$

Next, we write each of the expressions in the parentheses as one number.

We get,

$$\frac{1}{3}\ [\ (\ 5^3\ )\ -\ (\ 17\ )\ ]\ =$$

$$\frac{1}{3}\ [\ 125\ -\ 17\ ]\ =$$

$$\frac{1}{3}\ [\ 108\ ]\ = 36$$

Please go on to question 20 below.

Question 20

Apply the proper principle and find the value of the expression

$$10\ [\ 5\ (\ 2x\ +\ 5\ )\ +\ y\ ]\ +\ z$$

if

$$x = 3$$

$$y = 4$$

$$z = 5$$

Select the letter which labels the correct statement.

(A) 250

(B) 345

(C) 495

(D) None of these.

130/1

It is true that the product of 2 and 3 is an even number.

Are you sure that the set in your answer contains all the elements that it should?

Please return to page 147/1 and try question 8 again.

130/2

It's easy to be careless.

If you will follow along, we will try to " check "

$$x = 10$$

$$3(x + 3) - 7 \stackrel{?}{=} 26$$

$$3(13) - 7$$

$$39 - 7$$

$$32 \neq 26$$

Do you see your mistake?

Please return to page 139/2 and try question 12 again.

Your choice was an example of an equality.

Did you misread the question? You were asked to choose an inequality.

Please return to page 159/2 and try question 16 again.

Sorry, I'm afraid we disagree.

You found only some of the elements. Did you test each of the elements in the domain in the inequality?

Please return to page 169/2 and try question 19 again.

$\frac{132}{1}$

Sorry, we disagree.

You must substitute the same value for the variable in each of the places that it is found for in each trial.

trial 1 $3(5) + 2[4(5) - 2] = 7(5)$

if $y = 5$

---

trial 2 $3(3) + 2[4(3) - 2)] = 7(3)$

if $y = 3$

Did you test each element of your solution set in the original equation?

Please return to page $\frac{141}{2}$ and try question 14 again.

$\frac{132}{2}$

We disagree.

Your solution set contains one element which should not be there.

Please go back to page $\frac{164}{2}$ and test each of the elements again when you do question 18 .

Sorry, we disagree.

Perhaps you have confused zero with something else you had in mind? When zero is substituted for x in the inequality, we do not get a true statement.

Please return to page 160/2 and try question 20 again.

If the expression

$$J = M + 8$$

represents the statement

" John is 8 years older than Mary ."

What does M represent?

Can someone be zero years old?

Please return to page 170/1 and try question 1 again.

134/1

It's easy to be careless, but it often results in slowing you down. Do one operation at a time testing each new operation under the previous one!

Did you test the solution set

$$x \in \{5\}$$

in all three equations?

Please return to page 152/2 and try question 15 again.

134/2

It's easy to be careless.

When the element 5 , is tested in the inequality; does a true statement result? Try it again and check.

Return to page 150/2 and select the correct answer to question 17 .

It's true all of these statements are true sentences, but have you forgotten that an open sentence does not have a truth value?

Please go back to page 143/2 and try question 5 again.

Sorry, we disagree.

When 1 is substituted for the variable in the problem, the equation does not become a true statement.

Please return to page 156/2 and try question 13 again.

136
1

It's very easy to be careless. Did you read the problem carefully?

Statement I is an open sentence because it contains a variable and an algebraic verb, "=".

Please return to page 149/2 and try question 6 again.

136
2

Are you a little confused?

Each element of the solution set must be a multiple of both 3 and 2.

Is 9 such a number?

Please return to page 154/2 and try question 7 again.

It's easy to be careless.

Yes, III is an algebraic sentence, but it is not the only one of those statements that is an algebraic sentence.

Please return to page 126/2 and try question 2 again.

It's easy to be careless, but it makes you do things over again.

An equation is a statement that two things are equal.

Please return to page 142/2 and try question 10 again.

138
1

It's easy to be careless, but most of the time it's just as easy to be careful! What value did you use in place of x when you divided the product of 4 and x by 8 ?

Try using 3 for x .

Please return to page 124/2 and try question 4 again.

138
2

Whenever an even number is multiplied, an even number results as the product. Since 4 is an even number, there is no element in the domain which makes the statement true.

Please return to page 151/2 and look over the choices again.

Congratulations! Your answer is correct.

When the members of the domain are substituted in

$$x + 1 = 5$$

The only element that makes the sentence true is

$$x = 4$$

Then, when the elements are substituted in

$$2x - 3 = 7$$

the only true value is

$$x = 5$$

Please go on to question 12 below.

Question 12

Apply your knowledge of equations and solutions sets; select the letter below that indicates the solution set of x, if the domain for x is the set $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$$3(x + 3) - 7 = 26$$

(A) $x \in \{10\}$

(B) $x \in \{5\}$

(C) $x \in \{8\}$

(D) $x \in \{3\}$

$\frac{140}{1}$

What type number results from the multiplication of two odd numbers?

How much is

1 x 3 ?

5 x 3 ?

9 x 9 ?

Later on in algebra, you will learn how to prove that the product of two odd numbers is odd.

Please return to page $\frac{147}{1}$ and try question 8 again.

$\frac{140}{2}$

In order for a sentence to be an inequality, it must first be an algebraic sentence.

Is statement II an algebraic sentence?

Please go back to page $\frac{159}{2}$ and try question 16 again.

Congratulations! Your answer is correct.

When the variable x is replaced by the element 3, the statement becomes true.

$$3\,[\,2(x+1)-7\,] = x$$

$$3\,[\,2(4)-7\,] \stackrel{?}{=} 3$$

$$3\,[\,8-7\,] \stackrel{?}{=} 3$$

$$3\,[\,1\,] \stackrel{?}{=} 3$$

$$3 = 3$$

Please go on to question 14 below.

Question 14

Apply your knowledge of equations and solution sets; select the letter below that contains the solution set of y, if the domain for y is the set $\{1, 2, 3, 4, 5, 6, 7, 8\}$

$$3y + 2\,[\,4(y-2)\,] = 7y$$

(A) $y \in \{2, 3\}$

(B) $y \in \{3, 4\}$

(C) $y \in \{4\}$

(D) $y \in \{4, 5\}$

142
1

Congratulations!

You realized that since there was no element in the domain that made the statement true, the subset of the domain that we need was the empty or null set.

The null set is a subset of every set except itself.

Please go on to question 10 below.

142
2

Question 10

Choose the answer below that correctly describes the following statements:

I. $7x < 12$ II. $5x - 29$ III. $6x > 13$

(A) Only statement I is an equation.

(B) Only statement II is an equation.

(C) Only statement III is an equation.

(D) All three statements are equations.

The product of 3 and 12 is 36 .

Yes, 36 is divisible by 9 . Thus, I is a true statement.

Until you are given a domain for the variable x , the sentence that " the product of 4 and x is divisible by 8 " can neither be true nor false.

Congratulations! Your answer is the correct one.

Please go on to question 5 below.

Question 5

Apply your knowledge of open sentences to the following statement:

I. The sum of 3 and 9 is divisible by 4 .

II. The quotient of 144 and 16 is equal to the sum of 4 and 5 .

III. The product of 27 and 4 is divisible by the sum of 4 and 2 .

(A) None of these statements is an open sentence.

(B) Statements I and II are open sentences.

(C) Statements II and III are open sentences.

(D) All of the statements are open sentences.

$\frac{144}{1}$

Have you forgotten the definition of open sentence?

An open sentence contains a variable and an algebraic symbol.

Look at the statements again. Do you see any variables? Any symbols?

Please return to page $\frac{149}{2}$ and try question 6 again.

$\frac{144}{2}$

We disagree.

Substitute each value carefully. Do the addition within the parentheses first; multiply the sum by 3 , and after subtracting 7 see whether the result is 26 .

Return to page $\frac{139}{2}$; check your arithmetic before doing question 12 again.

Did you test the solution set in all three equations?

Please test each equation again, being more careful to avoid silly mistakes.

Do one operation at a time.

Please return to page 152/2 and try question 15 again.

It's easy to be careless.

You overlooked an element of the solution set. See if you can find it yourself.

Please return to page 150/2 and try question 17 again.

II

146
1

Congratulations!

You recognized that each of those symbols determinesan algebraic sentence.

Your answer is correct.

Please go on to question 3 below.

146
2

Question 3

Choose the letter below that correctly describes the following statements:

I. $5 < 2 + x$

II. $13 > 6 + 4 + 2$

III. $x - 4 = 35$

(A) Statements I and II are open sentences.

(B) Statements II and III are open sentences.

(C) Statements I and III are open sentences.

(D) All three are open sentences.

Congratulations! Your answer is correct.

Please go on to question 8 below.

Question 8

Choose the solution set (for the variable x) for the following open sentence.

The product of x and 3 is an even number.

$$x \in \{1, 2, 3, 4, 5, 6\}$$

(A) $x \in \{2\}$

(B) $x \in \{1, 3, 5\}$

(C) $x \in \{1, 2, 3, 4\}$

(D) $x \in \{2, 4, 6\}$

Sorry, we disagree.

Did you test both elements from your solution set?

Return to page 156/2 and try question 13 again.

148
1

Congratulations! Your answer is correct.

An equation is an open sentence using the symbol " = " . It is a statement that two things are equal.

Please go on to question 11 below.

148
2

Question 11

Apply your knowledge of equations and solution sets and select the letter below that indicates the solution sets for both I and II if the domain for x in both is

$$x \in \{1, 2, 3, 4, 5, 6\}$$

I. $x + 1 = 5$

II. $2x - 3 = 7$

(A) I. $x \in \{4\}$
II. $x \in \{5\}$

(B) I. $x \in \{6\}$
$x \in \{2\}$

(C) I. $x \in \{4, 7\}$
II. $x \in \{4, 6\}$

(D) I. $x \in \{4, 5\}$
$x \in \{5, 7\}$

Congratulations!

None of the statements are open sentences because none contain a variable.

Please go on to question 6 below.

Question 6

Apply your knowledge of open sentences to the following statements then select the letter below which best describes them.

I. $x + 42 = 2x - 6$

II. $x - 5 + 3x - 7 + 18$

III. $5 - 3x < 4x + 17$

(A) Statement II is NOT an open sentence.

(B) Statement III is NOT an open sentence.

(C) Statement I is NOT an open sentence.

(D) NONE of the statements are open sentences.

150
1

An open algebraic sentence using one of the following symbols (or the negative of these)

$$>, <, \geq, \leq$$

and, of course, the symbol $\neq$

is an inequality. Only statement III fits both conditions, it is an algebraic sentence, and it does not use the symbol

" = "

Your answer is correct.

Please go on to question 17 below.

150
2

Apply your knowledge of inequalities to the following; then select the letter below which contains the solution set for the statement:

The product of 3 and $x \leq 12$

Let the domain for x be

$$\{0, 1, 2, 3, 4, 5, 6, 7, 8\}$$

(A) $x \in \{0, 1, 2, 3, 4\}$

(B) $x \in \{0, 1, 2, 3, 4, 5\}$

(C) $x \in \{1, 2, 3, 4\}$

(D) $x \in \{0, 1, 2, 3\}$

Congratulations!

Your answer is correct!

Please go on to question 9 below.

Question 9

Choose the solution set for the following open sentence.

The product of y and 4 is an odd number.

$y \in \{1, 2, 4, 6, 8\}$

(A) $y \in \{2, 4, 6\}$

(B) $y \in \{1, 6, 8\}$

(C) $y \quad \emptyset$

(D) $y \in \{1, 2, 4, 6, 8\}$

Good work!

When the element 4 replaces the variable y in

$$3y + 2 [4 (y - 2)] = 7y$$

the following results:

$$3 (4) + 2 [4 (4 - 2)] \stackrel{?}{=} 7 (4)$$

$$12 + 2 [4 (2)] \stackrel{?}{=} 7 (4)$$

$$12 + 2 [8] \stackrel{?}{=} 7 (4)$$

$$12 + 16 \stackrel{?}{=} 7 (4)$$

$$28 = 28$$

Please go on to question 15 below.

Question 15

Determine the equation or equations below that have as a partial solution set, the set,

$$x \in \{ 5 \}$$

I. $9 (2x - 4) - [(x + 2)(x)] = 4x - 1$

II. $2 (x + 1) - 7 = x$

III. $\frac{42x + 12}{6} = 5x + 8$

(A) Only I

(B) Only II

(C) All three

(D) Only I and II

It's often easy to be careless.

Did you read the question correctly? The open sentence says that one quantity is less than or equal to the other.

Please return to page 160/2 and try question 20 again.

You are almost correct. Why can't John be 13 ?

Do you know whether or not Mary is under 5 ?

Please return to page 158/2 and try question 2 again.

154
1

An open sentence is a sentence containing a variable.

An algebraic sentence is a statement related by certain mathematical verbs;

$=$, $\neq$, $>$, $<$, $\geq$ and $\leq$.

As you recognized, none of these symbols is part of statement II.

Statement II is NOT an open sentence.

Please go on to question 7 below.

154
2

Question 7

Choose the solution set for the following open sentence:

x is a multiple of 3 and 2

$x \in \{2, 3, 4, 6, 8, 9, 12, 15, 16, 17, 18, 20, 21, 24, 27\}$

(A) $x \in \{2, 3, 6, 12, 24\}$

(B) $x \in \{6, 9, 18, 24\}$

(C) $x \in \{6, 12, 18, 24\}$

(D) $x \in \{4, 9, 16, 27\}$

Sorry, we disagree.

You have found two elements of the solution set; there is one more.

Did you test each element of the domain in the inequality?

Please return to page 164/2 and try question 18 again after you have tested each of the elements of the domain.

We disagree. If we look at a similar situation it may help you.

Suppose x is the width of a rectangle and the length of the rectangle is

$$4x - 12$$

Can the width be 3 ?

If it is 3 , then the length is

$$4(3) - 12$$

Now $4(3) = 12$

and $12 - 12 =$

$$0$$

Can the length of a rectangle be zero?

Can a person's age be zero?

Please return to page 186/2 and try question 3 again.

II

156
1

Congratulations! Your answer is correct.

When 8 is substituted for the variable, the following results:

$$3 (x + 3) - 7 = 26$$

$$3 (8 + 3) - 7 \stackrel{?}{=} 26$$

$$3 (11) - 7$$

$$33 - 7$$

$$26 = 26$$

Please go on to question 13 below.

156
2

Question 13

Apply your knowledge of equations and solution sets, select the letter below that indicates the solution set of x, if the domain for x is the set $\{1 , 2 , 3 , 4 , 5 , 6 , 7\}$

$$3 [2 (x + 1) - 7] = x$$

(A) $x \in \{ 1 \}$

(B) $x \in \{ 3 \}$

(C) $x \in \{ 1 , 3 \}$

(D) $x \in \{ 3 , 5 \}$

Sorry, we disagree.

Did you test each of the elements of your answer in the inequality?

Please return to page 160/2 and try question 20 again.

Your answer brings up an interesting point. If the piece of paper actually exists, then it must have a positive length. If the length is represented by

$$3n - 2$$

the values of n must be such that the expression

$$3n - 2$$

becomes a positive number.

Now when you say the n must be greater than 0, you are actually including values such as

$$\frac{1}{30}$$

or

$$\frac{1}{100}$$

which will make the expression a negative length. However, if certain larger values were chosen for n a possible answer would result. Since your answer includes wrong answers as well as right answers it is not acceptable.

Please return to page 166/2 and reconsider the question.

II

Very good.

In the expression

$$M + 8$$

the M represents Mary's age.

The + 8 represents how much older than Mary, John is. Since we are talking about Mary, she must have an age. She cannot be zero, but she could be

$$1, 2, 3, 4$$

or any large number.

Please go on to question 2 below.

Question 2

For the expression

$$J = M + 8$$

representing

"John is 8 years older than Mary. "

Choose the set of all possible values of

$$M + 8$$

(A) $\{9, 10, 11, 12\}$

(B) $\{9, 10, 11, 12, \ldots\}$

(C) $\{7, 8, 9, 10, \ldots\}$

(D) $\{1, 2, 3, 4, \ldots\}$

Congratulations! Your answer is the correct one.

When the value 5 is substituted for x in equation III , a false statement developes.

Thus,

$$x \in \{5\}$$

cannot be a solution set for the equation in III.

Please go on to question 16 below.

One or more of the following is an inequality. Recognize the correct choice.

I. $4(a + 6) - 3(3a - 5) = 12$

II. $4(a + 6) - 3(3a - 5) + 12$

III. $4(a + 6) - 3(3a - 5) \geq 12$

(A) Only I

(B) Only II

(C) Only III

(D) II and III , but not I

160
1

Congratulations! Your answer is correct.

Every element of the domain will make the inequality a true statement.

Please go on to question 20 below.

160
2

Question 20

Apply your knowledge of inequalities to the following; then select the letter below which contains the solution set of the statement,

$$4(x + 6) + 3(3x + 5) \quad 12$$

if the domain for x is the set

$$\{0, 1, 2, 3, 4\}$$

(A) $x \in \{0, 1, 2, 3, 4\}$ (C) $x = \emptyset$

(B) $x \in \{1, 2, 3\}$ (D) $x \in \{0\}$

Did you misread the question? You were asked to select the choice that could NOT be a value for x in the expression

$$3x - 6$$

Remember, the actual number of dollar bills is not a known quantity, but it does exist.

Please return to page 177/2 and try question 5 again.

Did you translate absent-mindedly? Let us give you a similar problem.

Think of the sentence,

12 is 4 less than 16 .

This is a true statement. How else could you express the same concept? Would you write,

$$12 = 4 - 16 \ ?$$

First, decide how you would express 12 is 4 less than 16 ; then,

Return to page 192/2 and try question 8 again.

II

162/1

I'm sorry, we disagree.

Consider the sentence,

7 is 3 more than 4 .

Would you write that as 7 + 3 = 4 ?

First write 7 is 3 more than 4 as a numerical sentence correctly, then return to page 198/2 and try question 11 again.

162/2

This was a tricky question. Consider first a similar problem.

10 is 4 less than 14 .

This can be written in the forms:

10 = 14 - 4 Note: each number can be

14 = 10 + 4 isolated on one side of the

4 = 14 - 10 equals sign.

Now make the transition from this arithmetic to your algebra problem. Write the algebraic relationship in the three forms. Compare these with the answer choices offered.

Please return to page 185/2 and try question 13 again.

Come now! If John is 8 years older than Mary, how old is Mary when John is 7 ?

Please return to page 158/2 and select a better answer to question 2 .

We disagree.

Perhaps if we look at a similar problem, it will help you. If r represents your age, and your brother, who is twice as old as you, is 28; would you say that you are older than 28 ?

Would you say that $r > 28$?

Now, if w represents a quantity twice as large as y , can $w < y$?

Please return to page 189/1 and try question 7 again.

II

164
1

Congratulations! Your answer is correct.

When each member of the set

$$0 \ , \ 1 \ , \ 2 \ , \ 3 \ , \ 4$$

is substituted in the open sentence, a true statement results.

Please go on to question 18 below.

164
2

Question 18

Apply your knowledge of inequalities to the following; then select the letter below which contains the solution set for the statement:

$$27 + x - 3 \geq 5 (x + 3)$$

Let the domain for x be

$$\{0 \ , \ 1 \ , \ 2 \ , \ 3 \ , \ 4 \ , \ 5\}$$

(A) $x \in \{0 \ , \ 1 \ , \ 2\}$

(B) $x \in \{0 \ , \ 1 \ , \ 2 \ , \ 3\}$

(C) $x \in \{1 \ , \ 2 \ , \ 3\}$

(D) $x \in \{1 \ , \ 2\}$

We disagree.

Did you misread the word "increased"? If your teacher increased your mark five points would he be adding or subtracting five points to your mark?

Please return to page 182/2 and try question 6 again.

The choice you made

$$y + 7 = x$$

can be translated as 7 more than y is x.

Is that what you were asked to interpret?

Please return to page 196/1 and try question 9 again.

II

Congratulations!

If $2x - 4$

is my brother's age, the expression

$2x$

must represent a number greater than 4 so that my brother's age is greater than zero. Every element of the set

$\{3, 4, 5, \ldots\}$

will make $2x$

a number greater than 4 .

Please go on to question 4 below.

Question 4

If

$3n - 2$

represents the number of inches in the length of a piece of paper, choose the correct statement about n .

(A) $n > 0$

(B) $n > \frac{1}{3}$

(C) $n > \frac{2}{3}$

(D) $n > 1$

Congratulations! Your answer is correct.

Since none of the elements of the domain make the inequality a true statement, the subset of the domain that is the solution set is the empty set.

You have now finished this SEGMENT. Hand in the PUNCH CARD. You should have entered in your notebook the following:

(1) The subset of the domain that makes the open sentence true is called the solution set of the variable.

(2) An open sentence using the symbol "=" is called an equation.

(3) An open sentence not using the symbol, " = " is called an inequality.

(4) Inequalities may use one of the following symbols,

$> \not> \geq \not\geq$ and $< \not< \leq \not\leq$ and $\gtrless \neq$

168/1

The statement you chose,

a + y = b

can be interpreted as

" b is a more than y ."

That is not what you were asked to show.

Please return to page 191/2 and reconsider problem 10.

168/2

When you are having trouble with a problem it is usually helpful to compare a simple numerical problem just like it. Analysis of your test case will generally direct your attention to the proper solution:

In " q is 7 less than x " makeup

8 is 7 less than 15 .

Write this relationship in the three possible forms:

8 = 15 - 7

15 - 8 = 7

15 - 7 = 8

Why don't you try this method as you reconsider the problem on page 194/2.

Congratulations! Your answer is correct.

When each of the elements

$$0 \ , \ 1 \ , \ \text{or} \ \ 2$$

is used to replace x in the inequality, a true statement results.

Please go on to question 19 below.

Question 19

Apply your knowledge of inequalities to the following, then select the letter below which contains the solution set of the statement,

$$14 + 2x < 4(x) + 15$$

if the domain of x is the set

$$\{0 \ , \ 1 \ , \ 2 \ , \ 3 \ , \ 4 \ , \ 5 \ , \ 6\}$$

(A) $x \in \{0 \ , \ 1 \ , \ 2\}$

(B) $x \in \{1 \ , \ 2 \ , \ 3 \ , \ 4\}$

(C) $x \in \{3 \ , \ 4 \ , \ 5\}$

(D) $x \in \{0 \ , \ 1 \ , \ 2 \ , \ 3 \ , \ 4 \ , \ 5 \ , \ 6\}$

VOLUME 2 SEGMENT 5 begins here:

Obtain a PUNCH CARD from your instructor. In addition to the other identifying information that must be furnished by you, you are asked to punch out the following:

COLUMNS	48 and 50	1 0	(Sequence Number)
	54 and 56	0 4	(Type of Punch Card)
	60 and 62	0 2	(Volume Number)
	66 and 68	0 5	(Segment Number)

Your READING ASSIGNMENT for the Segment is pg: 49 - 51.

SUPPLEMENTARY NOTES:

You must always be aware of the fact that every letter you use stands for a number. You should not write, " Let x represent the boy's height ". You should specify, " Let x represent the number of feet in the boy's height ". Of course, you could use inches or centimeters, or any other reasonable units. Would you consider it reasonable for the boy's height to be 60 ? Certainly it couldn't be 60 years, and it is not likely to be 60 feet. 60 inches would be reasonable. Then you must be very careful to specify the units you are using.

In translation from English to Algebra, there are two approaches possible. First, and definitely PREFERRED, is the direct translation of the English sentence as it stands. The other approach is to restate the meaning of the sentence in English, and then to translate it into Algebra.
For example: Bob is twice as tall as Allan translates as

$$b = 2a$$

Please turn to the next page. II

However, if Bob is twice as tall as Allan, isn't Allan half as tall as Bob? Then we would have

$$a = \frac{1}{2}b$$

The two equations are both correct, but it is more efficient to get the one which requires the least amount of work.

Since the order of words in English is not the same as in Algebra, there are certain standard translations which you ought to learn:

(1) x is 5 larger than y : $x = y + 5$

(2) x is 5 less than y : $x = y - 5$

Notice that: is becomes =,

5 more than becomes +5,

5 less than becomes -5.

(3) x exceeds y by 5, means the same as

x is 5 larger than y, giving

$$x = y + 5$$

While this is only a small sample of the translations you must learn, they are the most important.

Now that you have learned how to interpret Algebra in English and to translate English into Algebra, you will be asked a series of questions to draw your attention to the more important points.

Question 1

For the expression $J = M + 8$

representing the statement " John is 8 years older than Mary, " choose the correct domain of M.

(A) $\{0, 1, 2, 3, \ldots\}$ (C) $\{0, 3, 5, 7, \ldots\}$

(B) $\{0, 2, 4, 6, \ldots\}$ (D) $\{1, 2, 3, 4, \ldots\}$

$\frac{172}{1}$

Your answer raises an interesting point. Since the piece of paper exists, it must have some positive length (but we don't know just what length it is.) If n is greater than 1, as you say, then the length of the piece of paper must be more than 1-inch.

But do you have a right to assume this? Maybe it is a very small piece of paper.

Please return to page $\frac{166}{2}$ and reconsider the question.

$\frac{172}{2}$

There is a difference in measuring between

$$(4x) - 5$$

and $$4(x - 5)$$

In the first example; the parentheses can be omitted, and it is written

$$4x - 5$$

but the multiplication of 4 by x preceeds the subtraction just the same.

Please return to page $\frac{182}{2}$ and reconsider the question.

You must focus your attention in problems of this type.

Think of the sentence,

12 is 4 less than 16 .

This is a true statement. How else could you express the same relationship? Would you write,

12 - 4 = 16 ?

Of course not.

First, decide how you would express the sentence,

12 is 4 less than 16 .

Then, return to page 192/2 and try question 8 again.

The statement you chose

a = b - y

can be interpreted as

" a is y less than b "

That is not what you were asked to show.

Please return to page 191/2 and reconsider problem 10.

II

174
1

The statement you chose

$$y = 7 (x)$$

can be interpreted as

" y is 7 times x ."

Is that what you were asked to write in algebra?

Please return to page 196/1 and try question 9 again.

174
2

Sorry, we disagree.

The order of the values after

"difference between"

is important. You have chosen the translation of the statement,

" x is the difference between

z and 28 ."

Do you see the difference?

Please return to page 190/2 and try question 15 again.

Very good. Your answer is correct.

Let us review a good working method for solving problems of this type. You first make up a problem in arithmetic that is similar to the one presented in algebra. Suppose you chose as a sample for the given problem

" y is x less than z "

10 is 4 less than 14

This could be written as:

where 10 = y

$10 = 14 - 4$ 14 = z

and 4 = x

which would be : $y = z - x$

Since the arithmetic relationship can be rearranged as:

$14 = 10 + 4$ the algebra can also be rearranged as

$z = y + x$

and

$4 = 14 - 10$

and

$x = z - y$

Please proceed to question 14 below.

Question 14

Each of the following choices is a correct interpretation of the equation

$$x = 2y - 3$$

into English. Choose the one which is the most direct translation.

(A) The difference between 2y and x is 3

(B) 2y represents a number which is 3 more than x

(C) x is 3 less than double the number y

(D) y is one-half of the sum of x and 3

176
1

It's easy to be careless. Which variable are we concerned with in this question,

M

or M + 8

Did you misread the question?

Please return to page 158 and try question 2 again.
2

176
2

"The product of 4 times a number and 5 " is written algebraically as

(4x) (5)

This is not the problem that you are considering. The product of two numbers is the result of multiplying those two numbers.

Please return to page 182 and try question 6 again.
2

Congratulations! If

$$3n - 2$$

represents the number of inches in the length of a piece of paper (no matter how long it is), then

$$3n - 2$$

must be a number greater than zero. Only an n greater than $\frac{2}{3}$ will meet that condition.

Please go on to question 5 below.

Question 5

Apply your knowledge to select the choice that could NOT be a value for x in the following:

"If x is the number of dollar bills I have, then

$$3x - 6$$

is the number of dollar bills you have."

(A) 5

(B) 1

(C) 3

(D) 2

178
1

Yes, w is sometimes greater than y .

However, this is NOT the correct answer to the question.

Suppose your school admitted only tenth-grade students; then y would be zero, but so would w . Would w be greater than y ?

Please return to page 189/1 and try question 7 again.

178
2

It's easy to be careless. Think of the sentence,

12 is 4 less than 16

This is a true statement. How else could you express this relationship? Would you write,

12 - 16 = 4 ?

No. Well, this problem has the same relationship among it parts. First, decide how you would express the sentence,

12 is 4 less than 16

Return to page 192/2 and try question 8 again.

Did you confuse the phrase "more than" with the operation of multiplication? Consider the sentence,

7 is 3 more than 4 .

Would you write that as 7 = 3 (4) ?

First, write the 7 is 3 more than 4 as a numerical sentence.

Return to page 198/2 and try question 11 again.

Your answer is not wrong, but check the directions of the question.

You were asked to find two-thirds of 12.

You have correctly represented this statement, but you have not performed the operation of multiplication.

Please return to page 197/1 and complete the problem.

II

180
1

Sorry, we disagree.

You evidently mixed up the two letters. You have chosen the translation of the statement:

" z is the difference between x and 28 ."

Please return to page 190 2 and try question 15 again.

180
2

Sorry, we disagree.

What operation is signified by the word "product" ? Perhaps you will remember if you realize that the product of 4 and 2 is 8 .
The inequality symbol always points to the smaller value.

Please return to page 200 1 and try question 17 again.

Sorry, we disagree.

Consider the phrase,

7 is 3 more than 4

Would you write that as 4 = 3 + 7 ?

First write 7 is 3 more than 4 as a numerical sentence correctly.

Return to page 198/2 and try question 11 again.

Each of the choices is accurate, but one other than the one you chose is a direct translation.

Please return to page 175/2 and reconsider the problem.

II

Congratulations!

If $3x - 6$

represents the number of bills you have, then

$3x - 6$

can represent any number greater than or equal to zero.

If you have any dollar bills, then

$3x - 6$

must represent a number greater than zero. If you don't have any dollar bills, then $3x - 6$

represents zero.

If x were 1

then I would have one dollar bill, and you would have

$3(1) - 6$

dollar bills.

This is impossible, thus; 1 is the choice that cannot be a value for x.

Please go on to question 6 below.

Question 6

Apply your knowledge to determine the phrase represented by the algebraic expression:

$4x - 5$

(A) Four times a number increased by 5 .

(B) Four times the difference between a number and 5 .

(C) The difference between four times a number and 5 .

(D) The product of four times a number and 5 .

We are sorry, but we disagree.

A good technique in problems of this sort is to make up numbers of your own, choosing ones that fit the situation, then re-read the problem and interpret the relationships.

Please return to page 189/1 and try question 7 again.

Your choice,

$$a = b - y$$

can be interpreted as

" a is y less than b ."

This is not the same as the statement given.

Please return to page 191/2 and reconsider the problem.

184
1

The statement you chose

$$x = y + y$$

can be interpreted as

" x is 7 more than y ."

That isn't what the problem stated.

Please return to page 196/1 and try question 9 again.

184
2

Your answer is correct.

Please go on to question 19 which follows.

Question 19

The sum of the ages of John and his father is 5 smaller than twice his mother's age. If the ages of John, rather, and mother are represented respectively by x , y , and z

apply your knowledge to select the choice which states this fact.

(A) $x + y = 2z - 5$

(B) $x + y < 2z - 5$

(C) $x + y < 2z$

(D) $x + y = 5 - 2z$

The sentence,

q is 7 less than x .

can be written in different ways. It is preferred that you write it in the form

$$q = x - 7$$

However, the other forms, such as

$$q + 7 = x$$

and $$x - q = 7$$

are equivalent.

Please go on to question 13 below.

Question 13

Choose the equation which is a correct representation of the statement:

" y is x less than z ."

(A) $x = z + y$

(B) $y - x = z$

(C) $x = z - y$

(D) $y - z = x$

Congratulations!

Mary has an age.

She is greater than zero. Thus, John must be greater than 8 .

The set of ages greater than 8 is the set ,

$$\{9 , 10 , 11 , 12 , \ldots\}$$

The upper limit is not specified.

Please go on to question 3 below.

Question 3

Choose the domain below for the variable x in the following relationship:

"If x is my age, then

$$2x - 4$$

is my brother's age."

(A) $\{3 , 4 , 5 , \ldots\}$

(B) $\{2 , 3 , 4 , \ldots\}$

(C) $\{1 , 2 , 3 , \ldots\}$

(D) $\{0 , 1 , 2 , \ldots\}$

No, we disagree.

When we write the symbol for larger than; the arrow $>$, we must be sure that it points in the proper direction. The arrow should always point towards the smaller number.

For example,

$$5 > 4$$

or $$4 < 5$$

Please return to page 200/1 and try question 17 again.

Have you forgotten the meaning of the word "quotient" ? Perhaps you will recall it if we tell you that the quotient of

10 and 2 is 5 .

Please return to page 195/2 and try question 18 again.

II

188
1

There is a misunderstanding here. The phrase "is smaller than" can be interpreted in at least two ways.

Let's take for example:

" 5 is smaller than 8 "

It is written

$5 < 8$

but the phrase

" 5 is 3 smaller than 8 "

can be written as

$5 = 8 - 3$

Please return to page 184/2 and try question 19 again.

188
2

I'm sorry, we disagree.

Let's consider your answer.

$w = 5z + 2$

Since w represents the cost of one pencil, and z the cost of one pen; you have written:

The cost of a pencil is two more than five times the cost of one pen.

Is this the statement you were asked to translate?

Please return to page 199/2 and try question 20 again

This choice is correct.

Now proceed to question 7 which follows.

Question 7

If y represents the number of freshmen, and w represents a quantity twice as large; choose the correct statement.

(A) $w < y$

(B) $w > y$

(C) $2w = 2y$

(D) $w = 2y$

In verbal problems you must be careful to represent the meaning of each variable used and the units of each number used.

In this problem,

if w represents the cost of one pencil;

then 5w and not 5 + w represents the cost of 5 pencils.

Please return to page 199/2 and try question 20 again.

II

190
1

Congratulations!

The most direct translation of the equation,

$$x = 2y - 3$$

can be arrived at in the following manner,

the part " x = " becomes " x is "

the part " -3 " becomes " three less than "

the part " 2y " becomes " double the number y . "

Thus, $c = 2y - 3$

is best translated as,

" x is three less than double the number y . "

Please go on to question 15 below.

190
1

Question 15

Choose the equation which is a translation of the statement:

" x is the difference between 28 and z .

(A) $x = z - 28$

(B) $x = 28 - z$

(C) $z = x - 28$

(D) $z + 28 = x$

There are different ways of representing the same idea. In order to write that 11 is 7 more than 4 , we could write,

$$11 = 4 + 7$$

We could also write, $11 - 7 = 4$

And we could also write, $11 - 4 = 7$

Each of these is valid. To write the statement,

"y is 7 more than x"

we could write, $y = x + 7$

or we could write, $y - 7 = x$

or we could write, $y - x = 7$

Your choice is correct. Please go on to question 10 below.

Question 10

Choose the equation which is a correct representation of the statement:

" a is b more than y . "

(A) $a + y = b$

(B) $a + b = y$

(C) $a = b - y$

(D) $a - y = b$

192
1

Congratulations! Your answer is correct.

You realized that the word "represents" can be translated as "equals", and the phrase w represents a quantity twice as large as y can be translated as:

$$w = 2(y)$$

or simply

$$w = 2y$$

Please go on to question 8 below.

192
2

Question 8

Choose the equation which is a correct representation of the statement:

" x is 4 less than m ."

(A) $x = 4 - m$

(B) $x = m - 4$

(C) $x - 4 = m$

(D) $x - m = 4$

$12\frac{2}{3}$ means 12 plus $\frac{2}{3}$

or an addition problem.

$\frac{2}{3}$ of 12

implies a multiplication problem.

Please return to page 197/1 and try question 16 again.

I'm sorry, we disagree.

Your choice actually says that W is larger than the quotient of m and r , because when 1 is added to the quotient, the sum equals W .

This contradicts the problem.

Please return to page 195/2 and try question 18 again.

194
1

Your answer is correct.

The phrase "more than" indicates an addition operation. Just as the sentence,

	7	is	3	more than	4
can be written	7	=	4	+	3
so the phrase	x	is	3	more than	y
can be written	x	=	y	+	3

or in symbols

$$\boxed{x} = \boxed{\begin{array}{c}3\\ \hline y\end{array}}$$

Please go on to question 12 below.

194
2

Question 12

Choose the equation which is a correct representation of the statement:

" q is 7 less than x ."

(A) $7 - q = x$

(B) $q + 7 = x$

(C) $q = 7 - x$

(D) $x = 7 - q$

Your answer is correct.

The term "product" indicates a multiplication operation. When we multiply algebraic terms, we may omit the symbol of operation; the multiplication sign.

To express the phrase "larger than" we may use the symbol as long as the symbol points towards the smaller value.

Please go on to question 18 below.

Question 18

Choose the statement which says that W is smaller than the quotient of m and r .

(A) $W < m + r$

(B) $W = \frac{m}{r} + 1$

(C) $W < \frac{r}{m}$

(D) $W < \frac{m}{r}$

196
1

Your answer is correct.

Please continue on to question 9 which follows:

Question 9

Choose the equation which is a correct representation of the statement:

" y is 7 more than x ."

(A) $y + 7 = x$

(B) $y = 7 (x)$

(C) $x = y + 7$

(D) $y - x = 7$

196
2

I'm sorry; we disagree.

If w represents the cost of one pencil, and z the cost of one pen, then your choice means.

"the cost of one pencil is 5 cents
plus the cost of one pen plus 2 cents."

This isn't the statement that you were given to interpret.

Please return to page 199/2 and try question 20 again.

Good. your answer is correct.

Please go on to question 16 which follows.

Question 16

Apply your knowledge to calculate two-thirds of 12 .

(A) $\frac{2}{3}(12)$

(B) 18

(C) $12\frac{2}{3}$

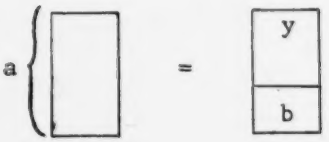
(D) 8

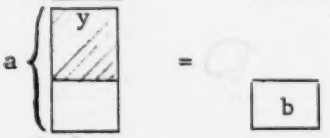
I'm sorry, we disagree. Merely saying that the sum of the ages of John and his father is less than twice his mother's age is not enough in this case. While true, it doesn't give a satisfactory picture of the problem, it ignores the fact that the difference between the two amounts is 5 .

Please return to page $\frac{184}{2}$ and select the better answer to question 19.

Your answer is correct.

You might be interested in seeing that the relationship can be described in three ways:

$a = b + y$ 

$a - y = b$ 

$a - b = y$

Please go on to question 11 below.

Question 11

Choose the equation which is a correct representation of the statement

" x is 3 more than y ."

(A) $x + 3 = y$

(B) $x = 3\,(y)$

(C) $x = y + 3$

(D) $y = 3 + x$

Congratulations' Your answer is correct.

The sum of ages of John and his father is

$$x + y$$

five smaller than twice his mother's age is

$$2z - 5$$

and the correct relationship is

$$x + y = 2z - 5$$

Although the phrase "smaller than" is used, the inequality sign is not employed because the actual difference is shown. When the difference is applied to the larger amount, it makes both amounts equal.

Please go on to question 20 below.

Question 20

The cost of a pen exceeds the cost of 5 pencils by 2 cents. Apply your knowledge to find the equation which states this relationship if w represents the cost of one pencil in cents, and z represents the cost of one pen in cents.

(A) $w = 5z + 2$

(B) $w = 5 + z + 2$

(C) $z = 5w + 2$

(D) $z = 5 + w + 2$

Your answer is the correct one. When we say

"two - thirds of ..."

or any other fraction of a number, we are indicating that the fraction is to be multiplied by that number. Thus, two-thirds of 12 is evaluated by

$$\frac{2}{3}(12) = \frac{24}{3} = 8$$

Please go on to question 17 below.

Question 17

Choose the inequality which states that y is larger than the product of p and q.

(A) $y > pq$

(B) $y > p + q$

(C) $y < p + q$

(D) $y < pq$

I'm sorry; we disagree.

The quotient of m and r is not expressed as $\frac{r}{m}$.

Perhaps if you tried to express the fact that the quotient of 8 and 3 is $\frac{8}{3}$, you would be helped in the expression of the quotient of m and r.

Please return to page 195/2 and try question 18 again.

Sorry, we disagree.

You have chosen one translation of the statement,

" z plus 28 equals x "

which is another form of

" 28 is the difference between x and z "

Please return to page 190/2 and try question 15 again.

202
1

It's easy to be careless. How do we represent the phrase

"five smaller than twice his mother's age"?

Perhaps if you look at a similar situation you might get a hint.

How would you write

13 is smaller than two times 9 ?

If we begin by writing two times 9 : 2 (9)

then saying

" 5 smaller than 2 (9) " : 2 (9) - 5

then saying, 13 is, or 13 = 2 (9) - 5

Please return to page 184/2 and try question 19 again.

202

You were asked to calculate two-thirds of 12 . Your answer represents three-halves of twelve.

Please return to page 197/1 and try question 16 again.

Congratulations! Your answer is correct.

The problem can be translated in the following manner; (the cost of a pen) exceeds the cost of 5 pencils by 2 cents.

let z = cost of a pen

w = cost of a pencil

$5w$ = cost of 5 pencils

Thus, we have $z = 5w + 2$

You have now finished Segment 5 and the Volume. Hand in the PUNCH CARD. You should have entered in your NOTEBOOK the following definitions and formulas:

a is k more than b	$a = k + b$
	$a - b = k$
	$a - k = b$

a is k less than b	$a = b - k$
	$a + k = b$
	$k = b - a$

The difference between a and b is k

$a - b = k$

You should be able to complete all of the problems from your HOMEWORK ASSIGNMENT:

You are now advised to review all of your notes and to re-read the reading assignment in order to prepare yourself for the volume test.

II

PROGRAMMED MATHEMATICS CONTINUUM
ALGEBRA - LEVEL ONE

ERRATA SHEET
VOLUME 2

Attach to
Back Cover

To the users of this book:

Computer analysis of the student's performance in his progress through this book will have as one of its purposes the collection of data indicating the need for revision of the material presented. Certain typographical errors already exist and will also be corrected.

Listed below are misprints that will affect the mathematics of the problems. Make a careful correction of each misprint as follows:

PAGE:	MISPRINT:	CORRECTION:	CHECK WHEN CORRECTION MADE
13/1		Thus we have: "in a similar problem"	
35/2		$(5 \div 4 \times \overline{3 + 2})]\}$ Add Bracket	
44/2	which set do not recognize	which set do you recognize.	
160/2		$3(3x + 5) \leq 12$ Add Sign	